WHITE PAPER

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UNIX and Microsoft Windows NT Interoperability

Contents

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.

NOTICE

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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.

When Windows NT workstations are introduced into a UNIX environment, some common issues may be encountered. They include;

- Sharing of files and printers
- Access to legacy applications running on UNIX or mainframe systems
- Use of UNIX utilities and scripts
- Running UNIX applications on a Windows NT workstation
- System administration

The following sections provide information on these interoperability issues and potential solutions. This paper also identifies the key software vendors that Compaq has partnered with to provide solutions.

FILE AND PRINTER ACCESS

When Windows NT workstations are introduced into a UNIX environment, it is extremely important that users are able to share files between systems. Also, users want to be able to utilize existing printers. Therefore, the first issue that needs to be addressed is file and printer sharing.

All UNIX operating systems use Network File System (NFS) as a way to share files and printers, while Windows NT uses Server Message Block (SMB). Windows NT does not include NFS as part of the operating system, and most UNIX vendors do not include SMB as part of their operating system.

Multiple File and Printer Sharing Solutions

There are four ways to provide file and printer sharing:

- 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. By installing an NFS client on a Windows NT workstation and a daemon on the UNIX server, the Windows NT user can use files and printers residing on a UNIX server.

An NFS client on each Windows NT workstation provides the flexibility to browse the network and see all exported directories, but does require loading software on each Windows NT workstation.

SMB on the UNIX server

SMB on a UNIX server allows the UNIX system to provide shares that any Windows NT workstation can access. 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 free software that is available for most flavors of UNIX. More information on SAMBA can be found at http://us1.samba.org/samba/samba.html.

SMB on UNIX eliminates the need for an NFS client on each Windows NT workstation, but requires that the SMB software be installed on each UNIX server.

NFS Gateway

The third option is to use an NFS gateway. The 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 benefit of a gateway is that no software needs to be loaded on either the Windows NT workstation or the UNIX server. An NFS gateway does require 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

When introducing Windows NT workstations into a UNIX environment, there are additional issues to keep in mind.

Case Sensitivity

UNIX file names are case sensitive while Windows NT file names are not. 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 or all upper case. This prevents a Windows NT user from storing two files with the same name but different cases.

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. Therefore, UNIX and Windows NT users must be aware of the naming conventions on both systems to insure each 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.

Performance

Early versions of Windows NFS clients were not as fast as native UNIX NFS clients. Changes in the NFS standard between version 2 and 3 have provided significant performance improvements. Also, the major NFS vendors have optimized their code to increase performance. By utilizing current versions of software, NFS client file read and write performance is similar to native UNIX NFS performance.

File And Printer Access		
Issue	**Solution**	**Products**
Access files on a UNIX server from a Windows NT workstation	NFS client software on the Windows NT workstation	Microsoft UNIX Add-On Pack Hummingbird Maestro Client Intergraph DiskAccess
	NFS gateway on a Windows NT server	Hummingbird Maestro Gateway Intergraph Access NFS Gateway
	SMB on the UNIX server	Digital 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

ACCESS TO APPLICATIONS ONLY AVAILABLE ON UNIX OR MAINFRAME SYSTEMS

Many UNIX workstation users moving to a Windows NT workstation will need to run applications on either a remote UNIX system or a mainframe system.

Character Mode

For character mode access, a Windows NT workstation user can use the telnet software included with Windows NT or terminal emulation software available from third party software vendors.

Xwindows Access

UNIX 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.

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	Terminal emulation software on the Windows NT workstation	Microsoft telnet Hummingbird Host Explorer
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	IBM 3270 and 5250 emulation software on the Windows NT workstation	Hummingbird Host Explorer

COMMON UNIX UTILITIES AND SCRIPTING LANGUAGES FOR WINDOWS NT

Many UNIX users and system administrators have extensive knowledge of UNIX utilities and use them frequently during the course of a day. They also use scripting languages such as Perl to automate repetitive jobs. Windows NT does not provide these utilities or scripting languages.

Third party vendors provide a wide range of UNIX utilities for Windows NT. These allow users and system administrators to use familiar UNIX utilities to perform their daily tasks on their Windows NT workstation.

Third party vendors also provide support for a wide range of utilities and scripting languages so users can continue to utilize their existing software.

Common UNIX Utilities and Scripting Languages for Windows NT		
Issue	**Solution**	**Products**
Use UNIX utilities on a Windows NT workstation	UNIX command set on Windows NT	Microsoft Resource Pack Microsoft UNIX Add-On Pack Mortice Kern Systems (MKS) Toolkit
Use UNIX scripts on a Windows NT workstation	UNIX shells and scripting languages on Windows NT	Microsoft Resource Pack Mortice Kern Systems (MKS) Toolkit DataFocus NuTCRACKER 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 two methods to allow UNIX applications to run on Windows NT.

Application Porting

The UNIX application can be ported to Windows NT. This can happen in a variety of ways. The most time consuming method is to completely re-write the application as a native Windows NT application.

A more cost-effective solution is to utilize a library of UNIX APIs that runs within the Win32 subsystem. This allows the UNIX source code to be recompiled and run as a Win32 application.

Application Hosting

Windows NT can support multiple subsystems that access the Windows NT kernel. Microsoft provides both Win32 and POSIX subsystems. Third-party vendors also provide POSIX subsystems that allow UNIX code to be recompiled and run 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**
Port UNIX applications to Windows NT	UNIX API support via a Windows NT library	DataFocus NuTCRACKER
Run UNIX source code on a Windows NT workstation	Recompile source code on POSIX subsystem running on Windows NT	Softway Systems Interix

SYSTEM ADMINISTRATION

When Windows NT 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 need two different user names and passwords.

Windows NT NFS client software can use NIS to validate users. There also are utilities to automatically update the 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 that is based on the AT&T ASU technology, an NT Domain Controller can be used to validate users needing access to the UNIX server.

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.

- Microsoft SMS allows system administrators to define the software to be loaded on remote systems and then automatically performs the installation.
- Some third-party software vendors provide utilities to centrally manage their NFS and Xwindows software.

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.

System Privileges

Windows NT allows the system administrator a great deal of control over what resources users can access. The System Policy Editor lets the administrator define what Windows NT utilities the user can run, and what configuration changes the user can make to the system. Therefore, the system administrator can configure the Windows NT workstation to have the desired level of system privileges.

Asset Management

Managing a large number of Windows NT workstations can be simplified by utilizing industry standard asset management capabilities. The Desktop Management Initiative (DMI) develops industry standards that allow centralized management of all assets. Compaq supports DMI standards, and provides utilities with each Windows NT workstation that allows system administrators to remotely view asset information, such as serial numbers on CPUs and peripherals and detailed system configurations. Compaq software integrates with Microsoft SMS and can be "snapped into" all the major enterprise management systems.

System Administration		
Issue	**Solution**	**Products**
Use UNIX utilities and scripts on a Windows NT workstation	UNIX commands shells on Windows NT	Microsoft UNIX Add-On Pack Mortice Kern Systems (MKS) Toolkit Softway Systems Interix
Synchronize Windows NT workstation and UNIX server passwords	Password synchronization software for Windows NT NFS clients	Microsoft UNIX Add-On Pack 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

INTEROPERABILITY PARTNERS

To ensure that Compaq Profession Workstations can be easily introduced into an existing UNIX 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 interoperability partners, and a link to their web sites where the reader can find more detailed information.

DataFocus Incorporated

DataFocus is a Fairfax, VA based software development firm specializing in UNIX-to-Windows compatibility. DataFocus' flagship product, NuTCRACKER®, is the award-winning, market-leading software solution that enables UNIX applications to run natively on the Windows operating system. Like all native Windows applications, NuTCRACKER applications can run on Windows NT, Windows 95, and Windows 98 and can take full advantage of Win32, COM, and the complete Windows DNA architecture.
www.datafocus.com

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 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 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) is a leading provider of software products in the software configuration management (SCM), Web object management (WOM), and NT/UNIX interoperability marketplaces. MKS offers a full suite of products, services and training to help users maximize their productivity across multiple platforms. 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