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NT & HP-UX Functional Interoperability

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Introduction

Windows NT has much of the functionality of HP-UX. This similarity exits at many levels, from an integrated, secure GUI user interface environment to coexistence of the two Operating Systems (OS's) at various levels of interoperability and integration. For instance, the interoperability of HP-UX and NT allow these two operating systems to mutually participate in printing, file and application sharing. This is because both HP-UX (using add-on software for non-IP protocols) and NT can communicate using TCP/IP, NetBEUI and NWLink network transport protocols. Therefore, network integration is available between the two OS's that allow users to interact with each other without being concerned with their connections into the network.

In concept, the system administration tasks and capability of NT closely parallel that of UNIX. However, NT's terminology and security methodology are different than those faced by the HP-UX System Administrator. However, there are tool sets such as OpenView from HP that allow a HP-UX administrator to manage and monitor both HP-UX and NT systems using a consistent interface. These types of tools allow bi-directional system management using an HP-UX or an NT desktop.

A consistent truth concerning the two OS's has been found: NT is no different than HP-UX with regards to planning. The same kind of problems that are faced with planning network infrastructure, user accounts and security, system administration, and the like on HP-UX are faced on NT. It's just the final implementation in many of the functional areas that is considered by some to be easier in NT than UNIX. Similarly, the applications and operating system on the NT side can appear more seamless for the end user due in part to the integration of a GUI technology with the core NT operating system.

However, from the viewpoint of a technical HP-UX workstation user and system manager, there are areas of functionality in the technical high end, that are currently lacking in a Windows NT desktop environment.

Interoperability

File Sharing

Functional interoperability exits between HP-UX and NT at many levels from the most fundamental network media (i.e. 10 Base T, etc.) to application sharing. File sharing, one of the most intuitive interoperability areas, is a good example.

The most basic form of file sharing is the ability to move a MSDOS (FAT or File Allocation Table) formatted floppy disk from an NT system to a HP-UX system. To do this, remember that a DOS text file should be converted to/from an HP-UX file by using the *ux2dos* and *dos2ux* utilities (commands to handle carriage returns and line feeds, etc.). If this is not done, text files can become unreadable by the host system editor. However, more sophisticated methods are available.

The underlying network file system for NT is based on SMB (System Message Block) whereas the file system for the HP-UX network is NFS (Network File System). This discontinuity does not present a problem however, since there are many alternative software packages available to transfer files over a network.

The least obtrusive of these alternatives is the utilization of the ftp (File Transfer Protocol) and rcp (Remote file CoPy) commands. These utilities use their own protocol and thus don't use either SMB or NFS. Of course ftp and rcp are standard on HP-UX as both client and server. NT 4.0 has available both ftp and rcp clients and an ftp service.

In addition, add on utilities are available to allow HP-UX to access NT networked files and NT to access HP-UX networked files. For instance, Advanced Server for Unix (HP Advanced Server/9000) is available from HP so that HP-UX files and directories can be accessed from a SMB based file system. Advanced Server includes other functions, such as security authentication, etc., which also help with system management and interoperability. Other options include SAMBA[1], a freeware program, which allows access to HP-UX resident data from an SMB based system.

NFS software, standard for UNIX environments, is packaged with HP-UX. It is not natively available on NT. However, there are many vendors, such as Hummingbird Communications Ltd.[2], that provide both NFS client and server software packages for Windows NT allowing file access through this standard UNIX mechanism.

Printing

The printing functionality is comparable on both HP-UX and Windows NT. NT comes standard with the means to access a HP-UX print spooler by utilizing both the remote line printer (rlp) command on the NT system and line printer daemon (lpd) on the HP-UX system. NT also comes with print monitors (similar to a print spooler daemon in HP-UX) for other print spooler hosts. Finally, the NT system has a print monitor for Data Link Control (DLC) protocol for accessing printers that are directly connected to the network.

From the HP-UX workstation side, printers spooled from a Windows NT system can be accessed via the rlp command on HP-UX. Windows NT has the lpd service (LPDSVC) available to allow HP-UX clients to print through NT. However, one note of caution, be sure the rlp command has the *Berkley* switch options set, to print postscript files from HP-UX through NT.

Terminal and Application Access

There are many software packages that allow terminal access or application display to/from HP-UX and Windows NT.

For terminal access, HP-UX provides telnet and rlogin/remsh/rexec clients as well as telnetd and rlogind daemons to allow multi-user access. NT on the other hand, only provides telnet, rsh (similar to remsh in HP-UX) and rexec clients. With add-on NT software packages, like OpenNT[3] that provide a telnet daemon service, NT can become a multi-user system in the traditional UNIX sense.

Windows NT does not support X11 Windows, Motif or CDE (Common Desktop Environment) natively, as does HP-UX workstations. Vendors outside of Microsoft provide software, which enable NT to be both client and server within X windows. Packages such as OpenNT, Reflection X[4] and TED for Windows[5], provide X11 services such that a NT desktop user can open an X terminal or X Window application from a HP-UX system and display it on their desktop.

Running Windows NT applications and interacting with them on a HP-UX workstation X11 desktop can also be done with the use of alternative packages. These alternative software packages, such as NTrigue[6] and NTED[7], provide a mechanism to "Xify" or in essence, trap the Microsoft Windows display calls and send them via X11 to the remote HP-UX system.   This then allows an HP-UX workstation user to run Windows NT applications in an X Window within the CDE or VUE environments.

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[1] Refer to http://lake.canberra.edu.au/pub/samba/samba.html
[2] Refer to http://www.hummingbird.com
[3] Refer to Softway Systems, http://www.softway.com/OpenNT
[4] Refer to WRQ, Inc., http://www.wrq.com
[5] Refer to TriTeal Corp., http://www.triteal.com
[6] Refer to Insignia Solutions, http://www.insignia.com
[7] Refer to TriTeal Corp., http://www.triteal.com

Although DCE (Distributed Computing Environment) is implemented on both operating systems, HP-UX has a full tool and feature set. Microsoft has currently however, incorporated only the remote procedure calls (rpc) portion of the OSF (Open Software Foundation) specification for DCE. This does, at a minimum allow some application interoperation between HP-UX and NT.

	HP-UX	Windows NT (Rev. 4.0)
File System (networking)	NFS	SMB
File System (enterprise/distributed)	DFS	DFS
File System (disk)	HFS, VxFS, LIF	NTFS, FAT
File System (miscellaneous)	FAT	FAT
File System (CD-ROM)	CDFS	CDFS
Network Transport	TCP/IP	TCP/IP, NetBEUI, NWLink
Network Addressing	DHCP, DNS	DHCP, DNS, WINS
Remote File Copy Clients	ftp, rcp	ftp, rcp
Remote File Copy Services	ftpd rcpd	ftpd
Remote Application Communication	DCE, rexec, remsh	DCE (rpc only), rexec, rsh
Remote Printing (client/server)	rlp/lpd, DLC	rlp/lpd, DLC
Remote Terminal Clients	telnet, rlogin, X windows	telnet
Remote Teminal Servers	Telnetd, rlogind, X windows	
Remote Application Display	X windows	
Window Environment	X11 windows (CDE or VUE)	WIN32

Table 1 : Native Functionality for HP-UX/NT Interoperability

HP-UX/NT Non-Coherence

Hardware

A comparison of Operating System functionality for HP-UX and Windows NT reveals that the hardware platform that each of these OS's run on also has a major impact on the potential or lack of potential of the OS. For example, the most prevalent hardware platform with the most applications available for Windows NT is the Intel x86 based system. Similarly, the available system architecture for HP-UX is the HP PA-RISC processor based. However, functionality for Windows NT changes drastically when it is run on a different hardware platform, such as Alpha. The same can be said for standard UNIX when its is run on an Intel-based system using SCO. Each OS has been tuned to its particular development platform.

Security

The security paradigm is also very different between HP-UX and NT. NT security is based upon regulating access to objects such as files, processes, printers, etc. To obtain access the user or user process must have been authenticated and authorized and then given the proper security access token. This token contains the user's SID (Security Identification) Group SID's and the user's rights. An important note: this security token is only built at the time of logon and is not rebuilt again until the next logon time. Security for a "Trusted" HP-UX system, on the other hand, is based upon a *shadow* password file and ACL (Access Control Lists) that are authenticated for each request of a secured resource. Thus a user can be denied resources while still logged on.

Windows NT is certified as a US DOD (United States Department Of Defense) C2 level security. However, an HP-UX system configured into "Trusted" mode can be certified for B1 level security.

Threads

Parallel processing for applications on a single system often requires the use of threads. Threads provide the parallel execution of sections of the application program stream. This gives the appearance of simultaneous execution on a single CPU system and real parallel execution on a multi-CPU systems. These threads or independent code fragments can be run (i.e. scheduled) either within a process (called User Threads) or scheduled within the operating system kernel (Kernel Threads). With Users Threads, each thread is given a portion of the time slice that the entire process was given by the Kernel. The Kernel Threads allow the process threads to run in their own time slice and space. At this time HP-UX implements only User Threads and Windows NT utilizes Kernel Threads.

High-Availability

In application areas that are mission-critical, the system availability or uptime becomes important. System availability that is critical is known as High-Availability. There are many High-Availability options and techniques. One such technique for helping ensure that the overall system is available is by attaching or clustering many individual systems together. These systems are normally attached by at least two LAN's (Local Area Network) or communication paths. One LAN carries the normal access traffic to/from the clustered systems to systems outside the cluster. The second LAN carries the *watchdog* or status information between the clustered systems so that if a system goes down (i.e. fails) then its functions can be *fail-over* or transferred to another working system in the cluster. This also requires disk drives that can be accessed by multiple systems as well. HP has a number of products the can be used with HP-UX to implement High-Availability, such as MC/ServiceGuard[8], TaskBroker[9] and many others. Microsoft is not currently shipping any products for NT in this area, but soon will be. Note:, however, that the first release however, will only work with a cluster of two systems. HP is also in the process of migrating many of its clustering and High-Availability technologies to Windows NT.

I/O Performance

The prevalent Windows NT platform is based on the Intel Pentium system. HP-UX only runs on HP PA-RISC systems. These systems have evolved different I/O (Input/Output) architectures. In many of the HP-UX technical workstations the I/O bus sustained performance is capable of between 48 to 235 Megabytes per second. Intel architecture based systems are able to sustain I/O performance from approximately 23 to 167 Megabytes per second. Many application areas require strong performance from the I/O bandwidth (as characterized by sustained memory accesses)[10] in order to accomplish the needed tasks. Examples of these applications areas include Manufacturing and Process Control, High-End Graphics and large simulations.

Graphics Performance

The performance of the Graphic subsystems tends to be an important issue for technical application areas. The functionality of these subsystems range from displaying standard 2D vectors to rendering with 3D lighting, shading and textures, to displaying virtual reality environments at the very high end. However, because of the current architecture differences between the two platforms, graphic performance remains a critical differentiator. For example the CDRS graphics benchmark[11] (a CAID, Computer Aided Industrial Design, benchmark) shows that the HP-UX workstation generate a mean indexes of approximately 30 to 67 (higher is better). The Intel/NT platforms are able to generate mean indexes of approximately 5 to 30 for the CAID benchmark. Many enhanced graphics boards for the Intel platform are being released such that this performance disparity will change rapidly.

Program Data Space

Simulations, analysis and visualizations of large data sets pertaining to complex designs require software programs to access large amounts of program data space. Windows NT allows programs or processes to grow up to 2 gigabytes in size. That however, includes both code and data. The HP-UX operating system, on the other hand, allows the process code (text) to be up to approximately 1.9

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[8] Refer to http://www.hp.com and search on ServiceGuard
[9] Refer to http://www.hp.com and search on TaskBroker
[10] Refer to STREAMS Standard benchmarks at http://www.cs.virginia.edu/stream
[11] Refer to Graphics Performance Characterization benchmarks at http://www.specbench.org/gpc

gigabytes in size. In addition, HP-UX allows the process data space to be extended up to approximately 2 gigabytes in size[12]. Thus HP-UX technical workstation process could be as large as 3.7gigabytes.

	HP-UX (Rev. 10.2)	Windows NT (Rev. 4.0)
Security	C2 and B1	C2
Threads	User	Kernel
Clustering	Yes (multi-system)	No (maybe soon 2 system cluster)
High-Availability	Yes	No (maybe soon)
I/O sustained bandwidth	Approximately 48 to 235 Mbytes/sec	Approximately 23 to 167 Mbytes/sec
Graphics Performance Index (CDRS benchmark)	Approximately 30 to 67	Approximately 5 to 39
Process Space	Up to Approximately 3.7 Gigabytes	Up to Approximately 2 Gigabytes

Table 2 : Summary of HP-UX/NT functional disparity for high-end technical applications

Summary

In conclusion, today Windows NT as a workstation desktop may be appropriate if the functionality required centers on an engineer working in areas such as documentation, budgeting and related project information. An HP-UX workstation, on the other hand, would be appropriate if the functionality required today focused on an engineer utilizing complex Computer Aided Design and Analysis tools for large data sets, critical availability or even fast process I/O performance. Whether NT is chosen or HP-UX the same administration processes and functions must be maintained (e.g. user accounts, print spooling, etc.). The network infrastructure must also be expanded and re-evaluated and perhaps re-designed, as new workstations are added and/or changed.

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[12] Using a shared data segment with a programming technique pioneered by Bob Montgomery of HP's Workstation Division.