Key Operational Tips – Printable Version

SASIxp / ABACUSxp applications generate a large amount of network traffic between the file server hosting the applications and the client workstation. These applications execute all code on the local client, the file server only functions as a common repository. These applications are only supported when the file server and clients' workstations are on the same Local Area Network (LAN). Recommendation: A minimum of 10Bps switched LAN infrastructure connecting the file server and client workstations. Large LANs with hubs and cascaded hubs will limit performance.

Key Operational Tips contain information regarding the *xp series*™software suite. These tips cover operating system upgrades, performance, hardware, and other areas. Check this Web page periodically for new tips and updates to existing tips.

Important: Key Operational Tips are recommended for use by network administrators, system administrators, and database administrators only.

Key Operational Tips Categories	
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Abbreviations and Acronyms
CAT – Category
CPU – Central Processing Unit
DOS – Disk Operated System
DMZ – Demilitarized Zone
FAT – File Allocation Feature
HCL – Hardware Compatibility List
GUI – Graphical User Interface
ICMP – Internet Control Message Protocol
IP – Internet Protocol
KB – KiloByte
Kbps – Kilobits per second
LAN – Local Area Network
MB – MegaByte
Mbps – Megabits per second
MDAC – Microsoft® Data Access Components
ms – millisecond
NAT – Network Address Translation
NCP – Netware Core Protocol
NIC – Network Interface Card
NSS – Network Storage Services
NW – NetWare
OEM – Original Equipment Manufacturer
PC – Personal Computer
PCL – Printing Control Language
RAM – Random Access Memory
RTM – Response Time Monitor
TID – Technical Information Document
TCP/IP – Transmission (Transport) Control Protocol/Internet Protocol
UNC – Universal Naming Convention
WAN – Wide Area Network

Antivirus Software Tips	See...
Do not allow antivirus software to scan network drives. • Do not allow workstations to scan network drives. • Ensure server antivirus software scans only .exe (executable) files. Exclude scans of .DBF, .DBT, .MDX file types.	Antivirus Programs

Citrix Tips	See...
SASIxp enrollment no longer functions after the installation of Microsoft® Windows 2000 server hot fix 324446 on a Citrix Metaframe XP server. An immediate 5004 error displays.	SASIxp no longer functions after installing hot fix 324446

Client Workstations Checklist	See...
All NetWare workstations should use same version of NetWare client.	n/a
Close query results screens as soon as possible.	n/a
Do not allow antivirus software to scan network drives. • Do not allow workstations to scan network drives. • Ensure server antivirus software scans only .exe (executable) files. • Exclude scans of .DBF, .DBT, .MDX file types.	Antivirus Programs
Do not allow workstations to scan network drives. Use only mapped drive connections to the server.	Miscellaneous Potential Causes of Slow Performance
If Oplocks must be enabled • Windows 9.x users must reboot workstation if SASIxp task is aborted for any reason. • Wireless workstations must not be allowed to roam beyond range of base node.	Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers
Macintosh clients should use latest available AppleShare® over IP drivers.	n/a
Macintosh TCP client should be set to Always On.	n/a
Set the Windows 9.x operating system to logon and restore network connections.	n/a
Use leanest print driver available for features that you need. • Do not use PostScript® printer drivers. • Use downlevel printer drivers if enhanced features are not needed. • Avoid Celeron® powered workstations for report generation. • Ensure default printers are always online and available. • Use newest driver available for features you require.	SASIxp / NCS ABACUSxp Software Print Query or Reports are Slow
Windows 2000 Temp variable cannot have spaces in path if NetWare client is installed.	n/a

Connectivity (LAN / WAN Infrastructure / Networking) Checklist	See...
Hubs Versus Switches • Use only switched connections to desktop workstations. • No more than 16 workstations per hub. • Never cascade hubs.	LAN Infrastructure, Large Collision Domain
LAN Wiring Infrastructure • LAN should be certified to CAT-5. • Confirm LAN wiring has not been damaged since certification. • Confirm LAN wiring distance limitations are not exceeded.	Network Wiring
Miscellaneous Network Performance Debug Tips	Miscellaneous Potential Causes of Slow Performance
Network Bandwidth Test	Network Tools
Network Data Integrity Tests	Network Tools
Network Interface Cards, (NICs) • Disable Auto-Negotiation. • Lock duplex mode on both ends. • Lock speed settings on both ends to LAN wirings certified capability.	Network Interface Cards / Switch Auto-negotiation Network Interface Cards / Switch Duplex Settings Network Wiring
Network Interface Cards, NICs Operating System Compatibility • Confirm NIC and driver are compatible with host operating system. • NIC drivers should be current.	http://www.microsoft.com/whdc/hcl/default.mspx
Network Reliability Test	Networking Performance Issues

InteGrade Pro Teacher Gradebook	See...
If server is running a backup, open file manager which takes snapshots of files and remove DataRepository.DAT from the snapshot file list.	n/a
If the server operating system is Windows 2003, ensure Shadow Copy is disabled.	n/a
Turn off virus scan of DataRepository.DAT.	n/a

Macintosh Clients Tips	See...
After upgrading a Novell NetWare 6.5 server with post RTM service packs or patches, the SASIxp software might not launch from a Macintosh workstation.	After upgrading a Novell Netware 6.5 server with post RTM service packs or patches, the SASIxp software does not launch
Configure Macintosh clients to mount the network volume hosting at boot.	Miscellaneous Potential Causes of Slow Performance
Enabling antivirus programs to scan SASIxp or InteGrade Pro data files adversely affects performance of the applications.	Antivirus Programs
Mac OS® X operating system does not properly communicate with a Novell NetWare 6.5 Server using AFP3 protocol.(Note: this is not an officially supported solution, use at your own risk.)	Mac OS® X operating system does not properly communicate with a Novell NetWare 6.5 Server using AFP3 protocol
Macintosh operating systems do not authenticate to a W2003 server.	Macintosh operating systems do not authenticate to a W2003 server
SASIxp software does not work on a Mac OS X client when installed on a Novell NetWare 6.5 Server.(Note: this is not an officially supported solution, use at your own risk.)	SASIxp software does not work on a Mac OS X client when installed on a Novell NetWare 6.5 Server
Scanning with the SASIxp software on a Mac OS® 9.2x workstation using the Keyspan USB to serial converter requires Keyspan driver revision 1.9 or later.	Scanning with the SASIxp software on a Mac OS® 9.2x workstation using the Keyspan USB to serial converter requires Keyspan driver revision 1.9 or later
Set the Macintosh clients' TCP protocol to Always on.	Miscellaneous Potential Causes of Slow Performance

Macintosh Server Tips	See...
If the SASIxp software is installed on a Mac OS X server with mixed SASIxp clients (Macintosh, Windows) you might encounter an error if you are using the same network user ID to authenticate to the server.	n/a

Network Troubleshooting Tools Checklist	See...
Test network throughput using the NetIQ Qcheck bandwidth tester.	Network Tools
Use the Ping command to test data reliability.	Networking Performance Issues
Use the Ping command to test data turnaround time and estimate network bandwidth.	Network Tools

Novell Netware Tips	See...
After upgrading a Novell NetWare 6.5 server with post RTM patches, the SASIxp software would not launch from a Macintosh® workstation.	After upgrading a Novell Netware 6.5 server with post RTM service packs or patches, the SASIxp software does not launch
Do not allow screen savers to run on the SASIxp, NCS ABACUSxp, or CLASSROOMxp server.	n/a
Do not install more NetWare name spaces than necessary.	Miscellaneous Potential Causes of Slow Performance
Enabling antivirus programs to scan SASIxp or InteGrade Pro data files affects performance of these applications.	Antivirus Programs
If you must use a NetWare client, use the latest one available with the latest service pack available and insure that each workstation client is properly configured for use with SASIxp products.	Novell Client32 Redirector Configuration Recommendations
Insure that Opportunistic Locking is disabled at the server on all protocols used by the SASIxp software.	Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers
Loss of communications might occur between Microsoft Windows XP clients and Novell server after installing Windows updates to the Windows XP client.	Loss of communications might occur between Microsoft Windows XP clients and Novell server after installing Windows updates to the Windows XP client
Potential for leaving open files on a Novell NetWare server when running SASIxp, NCS ABACUSxp or CLASSROOMxp applications.	Files Left Open by SASIxp, NCS ABACUSxp or CLASSROOMxp Software on a NetWare Server
SASIxp / NCS ABACUSxp software and data corruption when using Microsoft client for NetWare or Microsoft Windows clients on Windows 9.x workstations.	SASIxp™ / NCS ABACUSxp™ Software and Novell® / Windows® Clients Reported Issue
SASIxp / NCS ABACUSxp software performance tuning on heavily used NetWare servers.	SASIxp / NCS ABACUSxp Software and NetWare Server Settings
SASIxp software does not work on a Mac OS X client when installed on Novell NetWare 6.5. (Note: this is not an officially supported solution, use at your own risk.)	SASIxp software does not work on a Mac OS X client when installed on Novell NetWare 6.5
Server LAN connection should be at least 100Mbps full duplex, and the server NIC and switch port where the server LAN connection terminates should be manually configured to these settings.	n/a
Turn off the Windows Server Opportunistic Locking function to prevent corrupted database files.	Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers

ParentCONNECTxp Tips	See...
ParentCONNECTxp Admin App cannot locate a valid index for the ASCH file during school import.	ParentCONNECTxp Admin App cannot locate a valid index for the ASCH file during school import

SASIxp Software Tips	See...
Enrollment does not operate from a school if the Task Server IP address is NATed at District.	SASIxp / NCS ABACUSxp Central Enrollment Does Not Function
Ensure the SASIxp Datafile folder does not contain unnecessary files. The number of files in the SASIxp Datafile folder directly effects SASIxp performance. Remove files such as Demo Data, Temp, and unnecessary history files. Contact Pearson Digital Learning Global Support for assistance.	n/a
Lost or corrupted data, most likely Attendance data.	Lost or corrupted data, most likely Attendance data
SASIxp / NCS ABACUSxp Query Launches Are Slow	SASIxp / NCS ABACUSxp Query Launches Are Slow
SASIxp / NCS ABACUSxp Software Backups Are Slow	SASIxp / NCS ABACUSxp Software Backups Are Slow
SASIxp / NCS ABACUSxp software print preview might not work when these applications are hosted on a Novell NetWare server with a Windows 2000 or Windows XP workstation using the NetWare client.	Miscellaneous Potential Causes of Slow Performance
SASIxp / NCS ABACUSxp Software Print Query or Reports Are Slow	SASIxp / NCS ABACUSxp Software Print Query or Reports Are Slow
SASI / NCS ABACUSxp Version 6.x Software Suite Support Matrix	http://customerlink.pearsondigital.com/ProductSupportDocs/PDFs/sasi_software_support_matrix_revA.pdf
SASIxp File and Directory Permissions	SASIxp File and Directory Permissions
SASIxp Thin Client Support and Implementation	http://customerlink.pearsondigital.com/KOT/PDFs/SASIxpthinclFAQcustfin0510.pdf
SASIxp, NCS ABACUSxp, CLASSROOMxp Operation / Performance Suggestions	SASIxp, NCS ABACUSxp, CLASSROOMxp Suggestions Checklist
Some files might not display in various SASIxp File Code columns.	File Attributes

SASIxp / NCS ABACUSxp / CLASSROOMxp Applications	See...
Remove all Demo Data files in and under the Datafile folder.	n/a
Remove all History files in and under the Datafile folder.	n/a
Remove all Temp files in and under the Datafile folder.	n/a

ScanTools / Scanning Tips	See...
Scanning with the SASIxp software on a Mac OS 9.2x workstation using the Keyspan USB to serial converter requires Keyspan driver revision 1.9 or later.	Scanning with the SASIxp software on a Mac OS 9.2x workstation using the Keyspan USB to serial converter requires Keyspan driver revision 1.9 or later
ScanTools® File and Directory Permissions	ScanTools File and Directory Permissions

Server Settings Checklist	See...
Disable Client File Caching (Opportunistic Locking) on all Novell NetWare servers.	Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers
Disable Opportunistic Locking on Microsoft Windows NT® or Windows 2000 servers if possible or if you experience any of the following: • SASIxp, NCS ABACUSxp, CLASSROOMxp software operation is slow or unstable. • Network connections are not completely reliable. • You have roaming wireless users. Any clients are operating over a Wide Area Network (WAN).	Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers
Do not allow a screen saver to run on the file server.	Miscellaneous Potential Causes of Slow Performance
Ensure the Microsoft Windows Service Pack levels on servers and workstations match if the operating systems are the same type.	http://support.microsoft.com/default.aspx?scid=fh;EN-US;sp
Ensure the server is running at least 100Mbps, switched, full duplex.	n/a
Ensure the service pack levels on servers and workstations are current. • Microsoft • Novell	n/a
If you are using Microsoft SQL Server™ 2000 for the SASIxp, NCS ABACUSxp, or CLASSROOMxp database and your SQL Server driver is at Microsoft Data Access Components (MDAC) level 2.7 Release to Manufacturing (RTM) (SQL Server SP3), you need to upgrade the SQL Server and client drivers by installing SQL server SP3a or MDAC 2.7 SP1 Refresh.	n/a
If you run SASIxp, NCS ABACUSxp, or CLASSROOMxp software on the server console, ensure that your users close the pop-up menus in these software programs when they have finished using them.	Miscellaneous Potential Causes of Slow Performance
NetWare servers should not have more name spaces than necessary.	n/a
On servers supporting Windows NT or Windows 2000 clients, change Windows NT and Windows 2000 Size Request Buffers to a value of 14596.	SASIxp / NCS ABACUSxp Software Print Query or Reports Are Slow
Run the SASIxp, NCS ABACUSxp, or CLASSROOMxp server on the Local Area Network with the workstations, not remotely.	n/a

Task Server	See...
Mac OS® 9 or Mac OS X Task Server might not start or might not allow enrollment to function.	Mac OS® 9 or Mac OS X Task Server might not start or might not allow enrollment to function
Microsoft® Windows® XP randomly disconnects mapped drive connections.	Microsoft® Windows® XP randomly disconnects mapped drive connections

Terminal Services	See...
SASIxp enrollment no longer functions after the installation of Microsoft Windows 2000 server hot fix 324446 on a Citrix Metaframe XP server. An immediate 5004 error displays.	SASIxp no longer functions after installing hot fix 324446

Windows Clients	See...
All client connections to the SASIxp folder located on the server should be via mapped drives.	Miscellaneous Potential Causes of Slow Performance
Do not enable the Windows 9.x client Quick logon option.	Miscellaneous Potential Causes of Slow Performance
Do not enable workstation antivirus software to scan network drives; performance could be degraded.	Antivirus Programs
Enabling Antivirus programs to scan SASIxp or InteGrade Pro DAT files adversely affects performance of these applications.	Antivirus Programs
If SASIxp, NCS ABACUSxp or CLASSROOMxp applications terminates abnormally on a Windows 9.x workstation, the workstation must be rebooted.	Files Left Open by SASIxp, NCS ABACUSxp or CLASSROOMxp Software on a NetWare Server
If the default printer for the workstation is a network printer, the SASIXP software launches much faster if the printer is online.	n/a
Novell NetWare Client for Windows must be configured for maximum data reliability.	Novell Client32 Redirector Configuration Recommendations
Opportunistic Locking must be disabled on all SASIxp / NCS ABACUSxp software servers. Pearson Digital Learning also recommends disabling opportunistic locking (for example, oplocks, client file caching, file cache level) at all clients.	Miscellaneous Potential Causes of Slow Performance
Potential loss of connectivity between a Windows XP client and a Novell NetWare server after installing Windows XP updates.	Potential loss of connectivity between a Windows XP client and a Novell NetWare server after installing Windows XP updates
Print performance is degraded if a Postscript printer driver is used to drive the printer device, especially on Celeron powered workstations.	SASIxp / NCS ABACUSxp Software Print Query or Reports Are Slow

SASIxp / NCS ABACUSxp software and data corruption when using Microsoft client for NetWare or Microsoft Windows clients on Windows 9.x workstations.	SASIxp™ / NCS ABACUSxp™ Software and Novell® / Windows® Clients Reported Issue
SASIxp / NCS ABACUSxp software print query or reports are slow.	SASIxp / NCS ABACUSxp Software Print Query or Reports Are Slow
Using Ctrl+Alt+Del followed by End Task to terminate a slow or suspected hung SASIxp, NCS ABACUSxp or CLASSROOMxp session on Windows 9.x workstations does not always terminate these applications properly. The workstation must be rebooted to ensure that remnants of the application, typically open files on the server, are properly closed.	Files Left Open by SASIxp, NCS ABACUSxp or CLASSROOMxp Software on a NetWare Server

Windows Server	**See...**
Do not run screen savers on the SASIxp, NCS ABACUSxp, or CLASSROOMxp server.	n/a
Enabling antivirus programs to scan SASIxp or InteGrade Pro DAT files adversely affects performance of these applications.	Antivirus Programs
Macintosh operating systems do not authenticate to a W2003 server.	Macintosh operating systems do not authenticate to a W2003 server
Potential loss of database integrity and/or large query functions failing.	Miscellaneous Potential Causes of Slow Performance
SASIxp / NCS ABACUSxp query launches are slow.	SASIxp / NCS ABACUSxp Query Launches Are Slow
SASIxp / NCS ABACUSxp software backups are slow.	SASIxp / NCS ABACUSxp Software Backups Are Slow
SASIxp / NCS ABACUSxp software print query or reports are slow.	SASIxp / NCS ABACUSxp Software Print Query or Reports Are Slow
SASIxp File and Directory Permissions.	SASIxp File and Directory Permissions
SASIxp Server LAN connection should be 100Mbps full duplex and the server NIC and switch port where the server LAN connection terminates should be manually configured to these settings.	Network Interface Cards / Switch Duplex Settings
SASIxp software does not install on a Windows 2003 server at the server console. The SASIxp installer requires JRE 1.3.x for installation on a Window 2003 server. Do not attempt to install the SASIxp software with JRE 1.4.x installed on the server.	n/a
ScanTools File and Directory Permissions.	ScanTools File and Directory Permissions
Turn off the Windows Server Opportunistic Locking function to prevent corrupted database files.	Miscellaneous Potential Causes of Slow Performance

Antivirus Programs

Reported Issue

The antivirus program on the server is scanning all files, which causes delays in response time.

Explanation

Scanning all files requires an enormous amount of server CPU cycles and greatly reduces the response of the SASIxp / NCS ABACUSxp software. The resultant slow performance is not as noticeable with most other applications, but the SASIxp / NCS ABACUSxp software opens a large number of files and accesses these files multiple times. Scanning the SASIxp / NCS ABACUSxp software data files slows performance considerably.

If the workstation is an Apple ® computer running an antivirus program, the default for some Apple antivirus programs is to scan all hard drives, including any attached network drives. This configuration also slows SASIxp / NCS ABACUSxp software client performance dramatically.

Resolution

Set the antivirus program to scan only executable-type files (for example, .EXE, .COM, .BIN, .SCR). In any case, do not set the antivirus program to scan .DBF, .DBT, or .MDX files.

On an Apple workstation, configure the antivirus program so that it does not scan network drives.

SASIxp no longer functions after installing hot fix 324446

Subject

SASIxp enrollment no longer functions after the installation of Microsoft® Windows® 2000 server hot fix 324446 on a Citrix Metaframe XP server. An immediate 5004 error displays.

Description

After the installation of the Microsoft Windows 2000 Server hot fix 324446 on a Metaframe XP server to solve slow login issues, SASIxp enrollment no longer functions. A 5004 error displays immediately after launching the Enrollment atom.

Solution

Install the Citrix hot fix XE103W2K038. This hot fix is available only via a support call to Citrix; the hot fix is not posted on the Internet.

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Miscellaneous Potential Causes of Slow Performance

Reported Issue

1. NIC is defective.
2. NIC is not in the "Windows® Catalog," formerly the **Hardware Compatibility List**(HCL).
3. NIC driver is not compatible with the operating system.
4. NIC driver is not up-to-date.
5. Workstation RAM is insufficient.
6. Windows workstation is in need of a routine system cleanup.
7. Incompatible Service Pack levels are on a Windows NT® server and a Windows NT Workstation client.
8. Print driver is not up-to-date or is overkill for printing requirements.
9. Client is using UNC connections instead of mapped drive connections.
10. SASIxp / NCS ABACUSxp software server is remote, not on the LAN.
11. Windows 9x clients are using Quick Logon.
12. Users run a query and leave the results window open on their screen longer than needed.
13. NetWare® servers have multiple name spaces on their volumes.
14. Novell® clients are not all at the same revision level across the entire network.
15. SASIxp / NCS ABACUSxp Print Preview function fails if the Windows user environment variable “Temp” does not exist or has a path that contains embedded spaces.
16. A screen saver might be running on the file server.
17. SASIxp, NCS ABACUSxp, and CLASSROOMxp drop-down menus load CPU to 100%.
18. Macintosh® clients do not mount network volumes at boot time.
19. Macintosh clients do not have TCP set to “Always on.”

Explanation

1. A defective NIC might function, but in a degraded mode or might flood the network.
2. A NIC not on the HCL might work but in a degraded mode.
3. Incompatible NIC drivers might appear to operate with the host operating system, but not at the rated or the indicated speed.
4. NIC drivers might appear to operate with Windows 2000 but not at the rated speed.
5. Insufficient workstation RAM causes workstation performance issues.
6. Windows workstations frequently become bogged down with unnecessary disk activity. This activity is due to files becoming fragmented or scattered in various places on the hard drive rather than being placed in contiguous locations. This situation is particularly problematic when Windows is allowed to manage the size and placement of its swap file. Windows self-management invites and causes the swap file to become fragmented and practically guarantees a performance penalty after several weeks or months of use if the swap file is not reorganized.
7. TCP/IP behavior was modified significantly in Windows NT Service Packs1–5, 6, and 6a. Using SP6a on the server and SP6 on a client can cause serious performance problems with some SASIxp / NCS ABACUSxp software functions. Specifically, the implementation of the TCP Nagle algorithm is different in some service pack releases. For details on Microsoft® implementation of the Nagle algorithm (as defined in RFC 896) see Microsoft Knowledgebase article Q214397.
8. Printer driver might not be up-to-date or might have extra embedded features that consume system resources, which can cause slowprinting or corruptedoutput.
9. UNC connections invoke more system overhead and make less efficient use of network resources at the client than mapped drive connections.
10. SASIxp / NCS ABACUSxp software server is remote, not on the LAN. SASIxp, NCS ABACUSxp, and CLASSROOMxp software applications run at the client, not on the file server. Therefore, all application code and associated libraries and data must be sent to the requesting client for execution, forcing all application traffic to pass across a slower WAN. All SASIxp, NCS ABACUSxp, and CLASSROOMxp software clients should be connected at LAN speed to the server. This connection should be a direct, switched connection rather than sharing a collision domain with other users on a hub.
11. Windows 9x clients using “Quick Logon” instead of “Logon and restore network connections” allow persistent network connections to remain unverified and unestablished until they are actually used. This speeds up boot-up time, but slows response time when a connection is first used.
12. Users run a query and leave the results window open on their screen longer than needed. This keeps the queried files locked and prevents utilization of oplocks if they are enabled on the client and the server. If oplocks are not enabled on the server, leaving query results on a client screen makes very little, if any, difference in the query times for other users.
13. NetWare® servers have multiple name spaces on their volumes. The directory cache is decreased by a factor equal to the number of name spaces that are installed. The more name spaces that exist, the fewer file entries can be cached in the Directory Entry Table.
14. Novell clients are not all at the same revision level across the entire network. Different client releases use different settings. In order to minimize confusion at the server, it is best to keep all client software at the same release level.
15. When Novell client software is loaded on a Windows 2000 workstation, the Windows environment variable “Temp” does not always resolve properly. This is a known, unresolved problem with the Novell client. See the Resolution section below for possible workarounds.

16. Screen savers, especially the 3D type, consume CPU resources. Although SASIxp, NCS ABACUSxp, and CLASSROOMxp applications do not run on the server, they place heavy demands on the server's file services. Running screen savers on the file server impacts the server's ability to offer file services to clients. Powering off the monitor does not solve the problem. You must ensure that the screen saver program does not run.
17. SASIxp, NCS ABACUSxp, and CLASSROOMxp drop-down menus load CPU to 100% and prevent other services from performing properly.
18. Macintosh clients not mounting volumes at boot time allows establishing connections on an as-needed basis, which extends the initial connection time.
19. Macintosh clients do not have TCP set to "Always on." Loading the protocol only when needed delays the initial connection time.

Resolution

1. Ensure that all NICs on the LAN are functioning properly and are not causing network problems. If in doubt, temporarily remove or replace suspect NICs.
2. Ensure the NIC is on the HCL. Check at http://www.microsoft.com/whdc/hcl/search.mspx.
3. Ensure the NIC drivers are compatible with Windows 2000. Check the computer's manufacturer first. Check with the NIC vendor only if the NIC is an add-on that did not ship from the OEM.
4. Ensure the NIC drivers are Windows 2000 compatible. Always use the workstation manufacturer's NIC drivers. For example, if the workstation is a Dell ® computer, get the appropriate drivers from Dell. Do not use the drivers from the NIC manufacturer if the NIC is built-in on the motherboard of the computer.
5. A minimum of 128Mb of RAM is needed to support Windows 2000 and a minimum of 64Mb is needed for Windows 9x workstations. Add more RAM if better client performance is desired.
6. Stop all applications and run the Windows Disk Defragmenter located at Start | Programs | Accessories | System Tools | Disk Defragmenter. Also, refer to the Performance area and the Troubleshooting area of http://www.annoyances.org for concise and relevant information about practical methods to improve Windows workstation performance. Specifically, the article "Stop Windows from Wildly Accessing your Hard Drive" has proven helpful to several Windows 9x users.
   See: http://www.annoyances.org/exec/show/ article07-035.
7. Ensure the Windows NT® server and any of its Windows NT clients are the same service pack level. If in doubt, consider applying SP6a to all Windows NT 4 machines.
8. Ensure the latest available Windows 2000 compatible print driver is installed. If the latest driver is still performing poorly, consider using a driver for an older, less sophisticated printer with less functionality. For example, most Hewlett Packard (HP) printers accept data from down-level HP-II drivers. A leaner driver most likely has less functionality and fewer features but might improve printing performance.
9. Use permanent drive mappings for all connections to the SASIxp / NCS ABACUSxp server.
10. Ensure all clients are on a switched LAN speed connection to the SASIxp / NCS ABACUSxp server.
11. When you use Quick logon (the default), Windows 9x starts faster than if the actual connections are made during startup. However, the first time you try to access a network drive, it takes a little longer for the contents of that drive to display or for an application to start. To have Windows 9x verify each persistent network connection at startup by establishing a session for each persistent connection, configure the Microsoft network client to "Logon and restore network connections."
12. If your environment uses oplocks and has Windows NT or Windows 2000 Professional machines on the network, instruct users to close query results screens as soon as they have finished using the query results information.
13. Place the SASIxp / NCS ABACUSxp program and data files on NetWare volumes with as few name spaces as possible.
14. Update all Novell clients to the latest version. Keep all clients at the same version and Service Pack level if possible.
15. Using a command window, run the Set command and ensure that the path for the "Temp" environment variable has a valid folder name and that there are no embedded spaces in the path. Microsoft recommends that you ensure that the hard disk on which the Temp folder is located has at least 20 MB of free hard disk space and that you have read / write permissions to the folder. If the path to the Temp folder does have embedded spaces, one possible workaround is to enclose the Windows User Environment Variable string for the Temp value in quotes. Alternately, you could push a batch icon to each user's desktop that sets a Temp variable to a path that contains no spaces and then launches the SASIxp / NCS ABACUSxp software from within that batch environment.
16. Disable the screen saver on all file servers. You can allow power management to turn the monitor off but do not allow a screen saver program to run regardless of whether the monitor is powered on.
17. A Software Action Request has been submitted to address the issue of drop-down menus loading the CPU to 100%. Until the issue has been resolved, if a user is running SASIxp, NCS ABACUSxp, or CLASSROOMxp software at the file server itself, ensure that the user does not leave either of these programs' drop-down menus open for extended periods of time.
18. Configure Macintosh clients to mount the volume where the SASIxp / NCS ABACUSxp software files exist.
19. Configure Macintosh clients to load TCP/IP software at startup by setting the properties of TCP to "Always on."

Note: For Macintosh clients, the http://www.macwindows.com Web site specializes in issues that arise when mixing Macs with NT networks. The entire site is a wealth of information. However, two pages, http://www.macwindows.com/Win2000.html and http://www.macwindows.com/servtips.html might be of particular interest to you if you are attempting to use Macintosh computers in a Windows NT environment.

Note: Macintosh clients cannot take advantage of the Nagle algorithm (as defined in RFC 896); and therefore, the Macintosh clients might not provide the level of performance on a TCP/IP network that similarly classed Intel® / Windows machines typically deliver.

Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers

Reported Issue

SASIxp, NCS ABACUSxp, and CLASSROOMxp™ software users experience data corruption or file-locking issues on NetWare® and Windows NT® and Windows® 2000 servers, which causes slow performance, freezes, or in some cases, the inability of users to log in to the SASIxp / NCS ABACUSxp / CLASSROOMxp software.

Explanation

Symptoms of this nature are sometimes caused by problems with the opportunistic locking (oplocks) functionality within the file server. Using oplocks can be a significant performance enhancement, but also has the potential to lose cached data on some networks, particularly WANs or networks that have reliability problems and environments with slow networks and impatient workstation operators. The oplocks feature automatically detects opportunities to exclusively lock files and cache them at the client for improved performance. With oplocks enabled on the server, the client can cache files even if the open mode of the file is not intended to allow the client to cache.

For example, if the client-side application has opened a file in READ_ONLY and DENY_NONE mode, the client logically cannot cache the file. However, by using oplocks, the client can have exclusive use of the file and keep a copy of it locally. With oplocks enabled on the server, the client can lock and cache the file for the complete session or until another user from a different workstation tries to access the file. When the client caches the file, the client notifies the server that the file will be cached. While the file is locked and cached, all local reads and writes from and to the file are handled from a local cache instead of from the network.

When a second user tries to access the file, the server sends a call-back (Novell®) or an oplock break (Microsoft®) to the workstation that has locked the file. The locking workstation must then flush its cache and write all the data to the file server which then unlocks the file.

If the communication process fails for any reason—for example, network latency, network connection failure, client performs a Ctrl+Alt+Del and End task, or unexpected client power-down—the client might not be able to properly inform the server that it is releasing and/or updating the file. The server waits for a response from the client and refuses to offer the file to any other requesting clients during the waiting time. If the waiting time (which could be up to 30–40 seconds per open file) expires, the server has to assume that no writes were made to the file and has to offer its current copy to the next client.

Resolution

NetWare Recommendation

Under network conditions where connections between the client and server are lost, or when users perform Ctrl+Alt+Del and End task to exit the SASIxp, NCS ABACUSxp, or CLASSROOMxp software abnormally, performance and data integrity can be compromised by the client not properly closing its open files on the server. This series of events can also leave the client operating system unstable in some cases. Windows 9x clients are more susceptible to operating system instability and to leaving files open at the server than a Windows NT or Windows 2000 client.

If the user performs Ctrl+Alt+Del and End task to exit the SASIxp, NCS ABACUSxp, or CLASSROOMxp software, they need to reboot the workstation to guarantee that the server is properly disconnected and the open files on the server are released.

Disable the Client File Caching setting on ALL NetWare servers.

Slow performance and client freezes can be reproduced in the Pearson Digital Learning test lab under normal network conditions with the server configured to allow Client File Caching (oplocks) using both Windows 9x and Windows NT / Windows 2000 clients. These issues disappear when Client File Caching (oplocks) is disabled at the server.

NetWare Servers Support Multiple Types of oplocks, depending on the protocol being used to connect to the server.

NetWare Oplock Functionality				
Operating System Version	**Protocol**	**Volume Type**	**Oplocks Levels Supported**	**Recommended Setting**
NetWare 5.1 SP6 or later NetWare 6.0 SP3 or later NetWare 6.5	NCP	Traditional	Level 1	Disable *
NetWare 6.0 SP3 or later NetWare 6.5		NSS	Level 2	Disable *
NW 6.0 & 6.5	CIFS	NSS	Level 1	Disable **
NW 6.0 & 6.5	AFP	NSS	None	N/A

1. Level 1 oplocks allow exclusive caching to the first client accessing the file. The client is allowed local reads and writes as long as no other clients access the file. Any access attempts by other clients causes the server to request that the first client push its updates to the server and release the file. If the client push is unsuccessful, file data can become stale, corrupt or both.

2. Level 2 oplocks allow the same features as Level 1 but additionally allow multiple file reads from multiple clients as long as no clients open the file for write access. Any attempt by any client to open the file for write access causes the server to request all clients to purge their local read-only caches. If the purge request is unsuccessful, the client application will be working with stale data.

* To disable NCP Level 1 Client File Caching on a NetWare 5.x or 6.x server, use Monitor and navigate to Server Parameters then to NCP. Under the NCP settings, set Client File Caching Enabled = OFF. The change takes place immediately and there is no need to reboot the server.

You must place the line "Set Client File Caching Enabled = OFF" in the STARTUP.NCF file of the server to ensure that the setting remains permanent.

Note: If you ONLY place the "Set" command in the Startup.ncf file and you do not change the setting using "Monitor," "Remote Manager," or another administration tool, you must reboot the server to initiate the change.

** To disable CIFS oplocks on NetWare servers you should remove the "checkmark" from the "Oplocks" selection box in the CIFS server properties tab of the "CIFS / AFP" selection under "File Properties" for the NetWare server via the iManager program and then restart the server.

However, our experience indicates that there is sometimes a conflict between the iManager setting outlined above and the same setting which appears in the servers "CIFS Configuration" tab of the server properties screen seen in "Console One." We have also seen occasions where having both of these settings unchecked still results in the server having its CIFS oplocks enabled.

In order to resolve the issue it may be necessary for you to do the following:

1. Remove the checkmark from the "Oplocks" box in both Console One and iManager as described above.
2. In the AUTOEXEC.NCF file, comment out (add # to the beginning of the line) the existing CIFSSTRT.NLM line, then add the same CIFSSTRT.NLM line at the end of the AUTOEXEC.NCF file.
3. Restart the server and observe the status of CIFS Oplocks as displayed on the console screen after the CIFSSTRT command been processed. Insure that CIFS oplocks remain disabled. If you miss the display due to console activity, you can check it manually by using the command "CIFS INFO" at the console prompt.

Windows NT / Windows 2000 / Windows 2003 Server Recommendations

Under network conditions where connections between the client and server are lost or when users perform Ctrl+Alt+Del and End task to exit the SASIxp, NCS ABACUSxp, or CLASSROOMxp software abnormally, performance and data integrity can be compromised by the client not properly closing its open files on the server. This series of events can also leave the client operating system unstable in some cases. Windows 9x clients are more susceptible to operating system instability and to leaving files open at the server than Windows NT / Windows 2000 clients.

If the user chooses to perform a Ctrl+Alt+Del and End task to exit the SASIxp, NCS ABACUSxp, or CLASSROOMxp software, they need to reboot the workstation to guarantee that the server connection is properly disconnected and the open files on the server are released.

Disable oplocks, especially if you experience data corruption, slow performance, freezes, or if your users experience difficulty logging in to the SASIxp, NCS ABACUSxp, or CLASSROOMxp software.

Using oplocks in Windows environments might be of benefit in a network that is in good working order and is using a Windows NT Workstation or a Windows 2000 Professional operating system on all client workstations. Windows 9x clients do not benefit from oplocks when two or more clients are using the SASIxp / NCS ABACUSxp software files.

Pearson Digital Learning could not reproduce file locking issues in the lab under normal network conditions using both Windows 9x and Windows NT / Windows 2000 clients in a well-connected LAN environment. However, Pearson Digital Learning experience with the oplocks feature suggests that in the interest of data integrity, oplocks should always be disabled on all SASIxp, NCS ABACUSxp, or CLASSROOMxp software servers.

You can configure Windows NT, Windows 2000, and Windows 2003 servers to disable oplocks by adding the following registry (REG_DWORD) values:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\LanmanServer\
Parameters\... EnableOpLockForceClose = 1 (default=0)
EnableOplocks = 0 (default=1)
CachedOpenLimit = 1 (default=0)
AutoDisconnect = FFFF (18 hours)

WARNING: Using Registry Editor incorrectly can cause serious problems that might require you to reinstall Microsoft® Windows. Microsoft cannot guarantee that problems resulting from the incorrect use of Registry Editor can be solved. Use the Registry Editor at your own risk. Always ensure that the registry is backed up before making any changes.

SASIxp / NCS ABACUSxp Software Print Query or Reports Are Slow

Reported Issue

Print Queries or reports are extremely slow.

Explanation

When running a Print Query or a standard report, performance can be affected depending on the type of processor, operating system, and print driver you use. Printing and spooling a print job is a processor-intensive task, so a Pentium® processor with more L2 cache (relative to a Celeron® processor) handles this task faster.

Architectural changes in the Windows NT® Workstation and Windows® 2000 Professional operating systems allow these operating systems to handle printing faster than Windows 9x systems. The print driver in use also affects how much processing power the print job needs. A PostScript® driver uses more processing power than a PCL driver and runs more slowly. An older PCL driver, for example, the PCL4, has less advanced printing features than the newer PCL6 driver but is smaller and runs slightly faster.

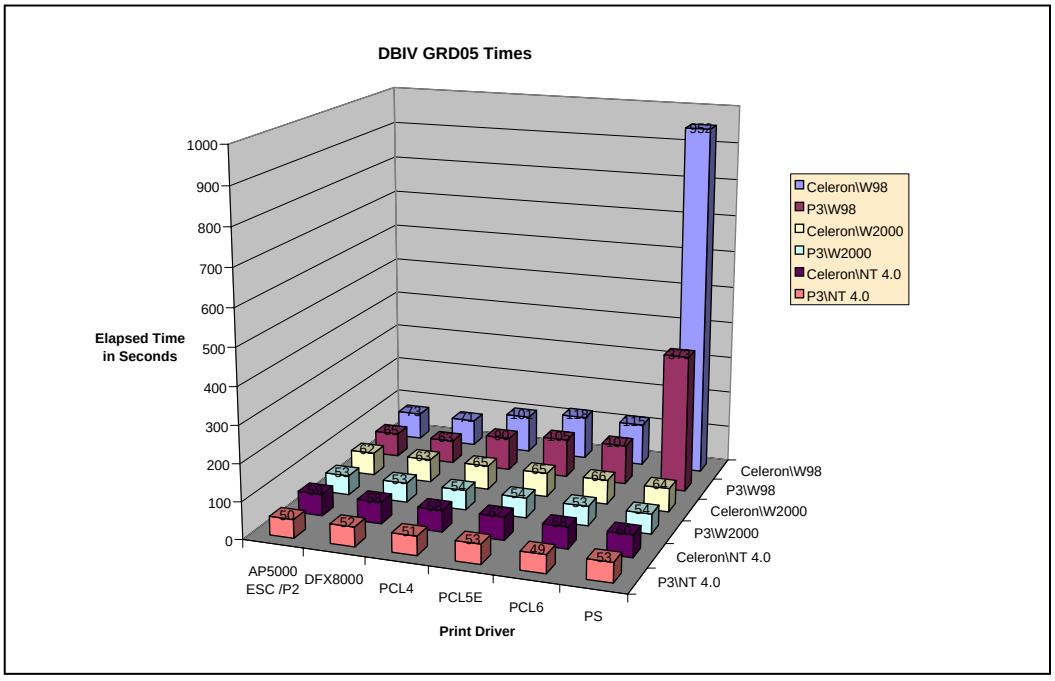
The slowest performance combination tested was a Celeron processor running Windows 98 with a PostScript® driver. In Pearson Digital Learning tests, this configuration took 15 minutes to print a Listing by Student (GRD05) report. The fastest performance combination tested was a Pentium processor running Windows NT with a PCL4 driver. This combination printed the same GRD05 report in less than one minute.

Resolution

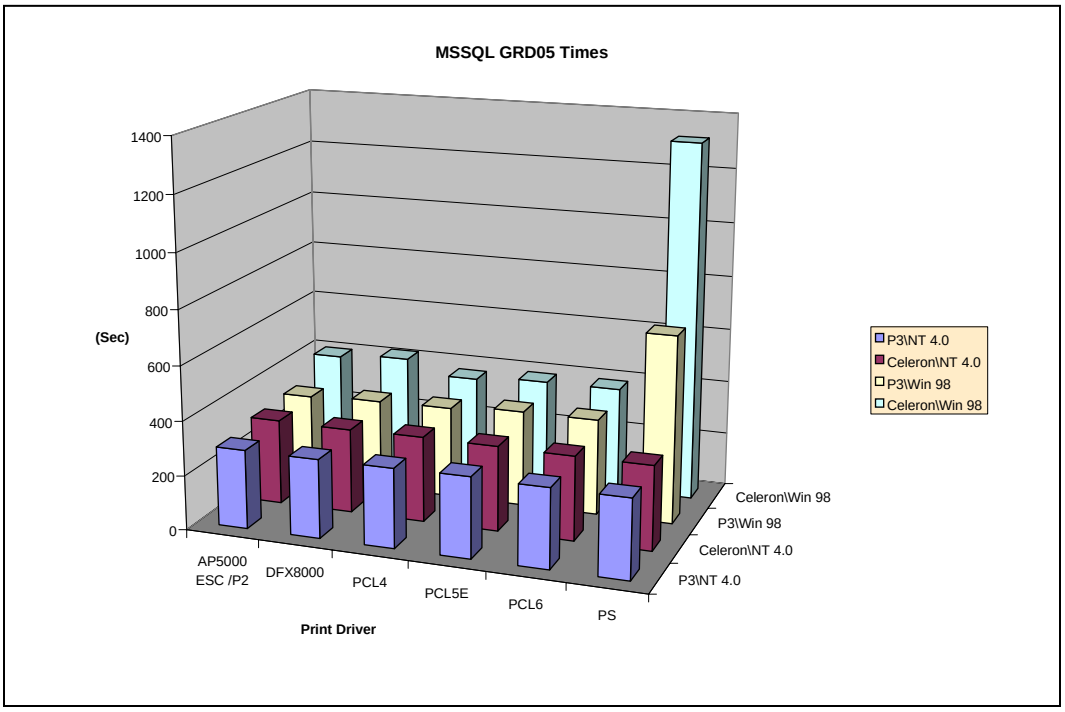
Do not use a PostScript driver on the default printer. (SASIxp / NCS ABACUSxp software uses the default printer.) If you need a PostScript driver for other applications, create another Windows printer for those applications and leave the default printer configured using a PCL4 driver.

Contact the printer manufacturer for information about how to download and install the newest driver for your workstation's operating system and your specific printer.

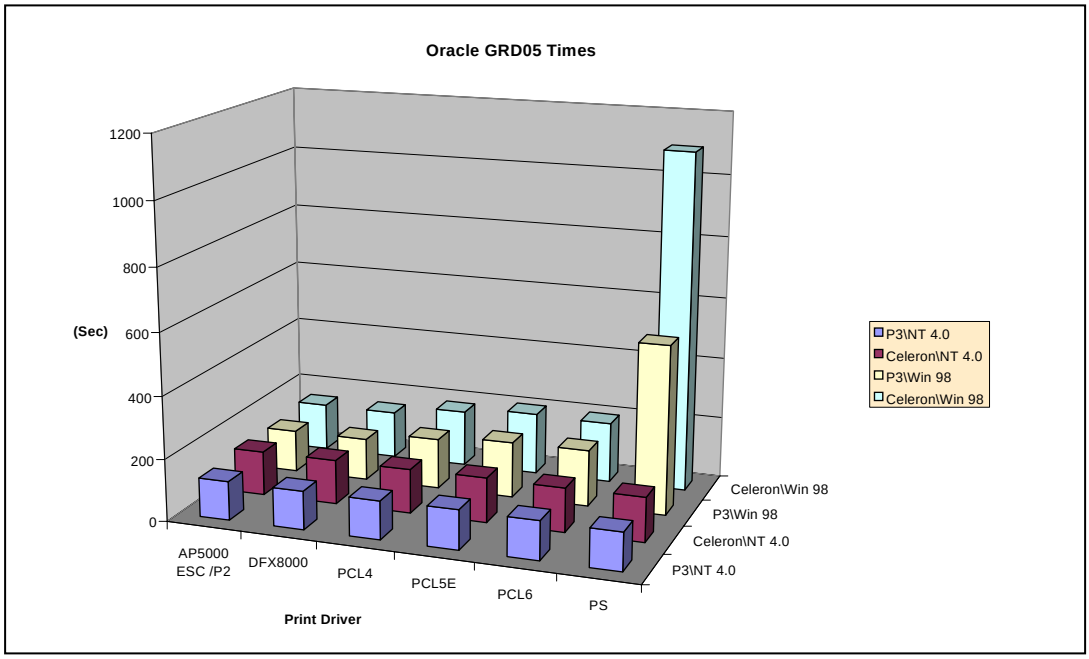
Performance Data



GRD05 print times with various CPUs, operating systems, and print drivers on the SASIxp / NCS ABACUSxp software with a dBASE® IV database



GRD05 print times with various CPUs, operating systems, and print drivers on the SASIxp / NCS ABACUSxp software with a Microsoft SQL Server™ database



GRD05 print times with various CPUs, operating systems, and print drivers on the SASIxp / NCS ABACUSxp software with an Oracle® database

LAN Infrastructure, Large Collision Domain

Reported Issue

SASIxp / NCS ABACUSxp software moves a large amount of data over the LAN between the server and workstations. SASIxp / NCS ABACUSxp software requires a well-designed and well-tuned network for optimum performance.

Explanation

By design, Ethernet communications can share the same transmit / receive wires in the cabling system. Each transmit / receive pair provides a data channel for network traffic. If the network LAN infrastructure is composed of hubs rather than switches, all devices are sharing the same data channel. This shared environment is called a collision domain.

When more than one device transmits at the same time, the result is a collision on the collision domain. When a node detects a collision, the device waits a random delay time and then attempts to retransmit the message. If the device detects a collision again, the node waits twice as long before attempting to retransmit the message. This is not a serious issue for most applications because network traffic is generally not heavy and is usually sporadic.

For example, Internet traffic can generate a large amount of network traffic, but any response delays introduced by a large collision domain are very small compared to Internet delays. Internet access from a school district is generally over a T1 or fractional T1 line. These connections and connections to a remote Web site create delays much larger than any delays generated in the collision domain.

SASIxp / NCS ABACUSxp software generates a large amount of network traffic each time a function is performed. If a large number of users are accessing the SASIxp / NCS ABACUSxp software system, the local network can be swamped with collisions and the throughput of the network can decrease to almost nothing. One instance when delay could occur is taking period attendance in the CLASSROOMxp™ software, which is extremely network intensive.

Resolution

Limit the size of the collision domain by using switches instead of hubs to expand the number of network nodes. Switches direct the traffic only between the two devices that want to communicate. Switches create separate collision domains between each connected node and the switch itself. This desegregation allows communication to proceed without collisions. Alternately, hubs send all traffic to all connected devices simultaneously, creating large collision domains.

The ideal network would consist of nothing but switched ports and use no hubs at all. A compromise is to limit the hubbed collision domain to a maximum of 16 workstations. These 16 workstations should be casual users, not Power Users. For example, a teacher's workstation could be on the same collision domain as a computer lab, with the assumption being that during the attendance-taking time, the other workstations would be idle.

Also, connect the server to a switch using a connection of at least 100Mbps, full duplex.

Network Wiring

Reported Issue

Network wiring infrastructure is not installed to full Category 5 specifications, or a Category 3 cable is used for a 100Mbps network connection.

Explanation

A network with a wiring system that does not meet the specifications for the communication protocols being used can cause a multitude of network throughput issues. Network delays caused by network errors force the nodes to perform numerous retries. Poor wiring results in workstations performing poorly, losing network connections, or randomly not connecting to the network. The SASIxp / NCS ABACUSxp software is slow to respond, hangs, or crashes with a protection fault or illegal operation because of lost network data and resultant corruption of a program's executable modules.

Resolution

Ensure the wiring infrastructure is installed and operating at the correct specifications. Person Digital Learning also recommends that you have all cabling certified to the correct specifications (at least CAT-5) using the appropriate tools. If you suspect the LAN is not operating at the rated bandwidth, see the Network Tools section of this document for an explanation of how to verify the connection bandwidth.

Note: You should also determine whether a NIC in one of the workstations within the collision domain is defective. Frequently, a defective NIC, a NIC not on the operating system's HCL, or a NIC card running a defective, corrupt, improper, or out-of-date driver can saturate the network and prevent proper communication between other nodes on the collision domain.

Network Tools

Bandwidth Tester

The Qcheck® program from NetIQ® Corporation is a valuable troubleshooting tool that can be used to quickly determine if the network is causing a performance problem. When loaded on two or more Windows® systems, Qcheck can be used to verify throughput on your network. For more details or to download this free product, go to www.netiq.com/qcheck.

Change the settings for the Qcheck throughput test from the default 100 KB to 1000 KB for a more accurate test. Network throughput on a 10BaseT network connection should run between 7 and 8 Mbps from all client systems. A 100BaseT network connection should run around 45 to 55 Mbps on a Windows 9x operating system and between 70 to 80 Mbps on a Windows NT® Workstation or a Windows 2000 Professional operating system.

If the results of your throughput tests are below these levels, the network infrastructure could be at fault or overloaded. You need to ensure that any connections that show substandard performance are checked by a qualified network technician.

Ping Test

To aid in determining a problem, you can execute the ping utility from a DOS or CMD window. The following is an example of the command:

Ping -n 999 -l 8192 'IP address'

Ping issues an ICMP command to the specified IP address.
-n Loop count (optional, default is 4)
-l Block size count (optional, default = 64, max = 65500, NetWare® max = 10000)
IP address 192.168.100.100
The -n and -l are lowercase and must be separated from the numbers by a space.

Note: You can cancel a ping command that is in progress by using Ctrl+C.

You might receive a ”Request timed out” response one time as the initial reply. This response is typical, but if this message is received after the first successful ping reply, then the network connection is suspect. The returned time value should be consistent after the first couple of successful ping replies; and on a typical LAN, the returned time value should be around 10ms. If the returned time is inconsistent, the network is suspect. The typical cause of time fluctuations is a busy network, bad wiring, or bad network components.

A typically successful reply to a ping on a LAN is shown below.

```
C:\>ping -n 999 -l 8192 159.182.96.200
Pinging 159.182.96.200 with 8192 bytes of data:
Request timed out.                                  ← (First ping is sometimes lost)
Reply from 159.182.96.200: bytes=8192 time=20ms TTL=127  ← (First reply is usually longer)
Reply from 159.182.96.200: bytes=8192 time=10ms TTL=127
Reply from 159.182.96.200: bytes=8192 time=10ms TTL=127
Etc… through 999 total replies.
```

Using the Ping Command to Estimate Actual WAN Bandwidth
Use the following formula to calculate the expected ping response time:
(packet size) * 8/Bandwidth in Kbps.

For example, using a serial link of 128Kbps and a packet size of 8192 bytes:
(8192) * 8/128 = 512ms
Therefore, an 8192-byte packet should take approximately 512ms to cross a 128Kbps line or 1024ms for the round trip.

Once the expected time is calculated, you can use pings to determine if the actual time is in the same range. Send a series of pings using various packet sizes and compare the results to the expected trip time. Remember that traffic congestion or high utilization on the link increases round trip time substantially. In addition, propagation delay related to the length of the circuit also adds delay.

Packet *Sizes* and WAN Speeds
The table below provides examples of different packet sizes and WAN speeds.

Packet size	Bandwidth (in Kbps)	Estimated Response Time (in Milliseconds)	Packet Size	Bandwidth (in Kbps)	Estimated Response Time (in Milliseconds)
512	56	146.29	512	1024	8.00
1024	56	292.57	1024	1024	16.00
2048	56	585.14	2048	1024	32.00
4096	56	1170.29	4096	1024	64.00
8192	56	2340.57	8192	1024	128.00
512	128	64.00	512	1544	5.31
1024	128	128.00	1024	1544	10.61
2048	128	256.00	2048	1544	21.22
4096	128	512.00	4096	1544	42.45
8192	128	1024.00	8192	1544	84.89
512	256	32.00	512	10000	0.82
1024	256	64.00	1024	10000	1.64
2048	256	128.00	2048	10000	3.28
4096	256	256.00	4096	10000	6.55
8192	256	512.00	8192	10000	13.11
512	512	16.00	512	100000	0.08
1024	512	32.00	1024	100000	0.16
2048	512	64.00	2048	100000	0.33
4096	512	128.00	4096	100000	0.66
8192	512	256.00	8192	100000	1.31

Note: The 10Mbps and 100Mbps networks generally respond slower than the calculated value. The response to a ping command is of a lower priority than other network traffic. This generally adds 5–10 milliseconds to the response if the ping has to contend with other network traffic.

Network Interface Cards / Switch Auto-negotiation

Reported Issue

NIC and LAN switch devices frequently fail to negotiate the correct duplex settings. If the devices fail to negotiate the correct duplex setting, one device sets itself to half duplex and the other device might set itself to full duplex. This situation causes the network connection to run at a fraction of the rated speed. A 10Mbps connection with one device connected at half and the other device at full operates at 1Mbps or less.

Explanation

The default-line protocol negotiation setting for NICs and switches is auto-negotiate or auto-detect. This setting requires each node device to negotiate line protocols with the node at the far end of its network link. Auto-negotiation works reasonably well in a same-vendor environment when current drivers are properly configured. In a mixed-vendor environment or when network cards and drivers are not completely compatible with one another, auto-negotiation is not always reliable. This situation often results in inconsistent, slow, or unreliable network connections.

Resolution

If response issues are reported by users, check the connection speed between the offending workstation and the server. You can verify connection speed in several ways. See the Network Tools section of this document for an explanation of how to verify a network connection. If the connection does not provide the proper bandwidth, you should confirm the nature of the node settings as described in the Network Interface Cards / Switch Duplex Settings section of this document.

Network Interface Cards / Switch Duplex Settings

Reported Issue

The auto-negotiate function of a NIC or LAN switch device does not perform auto-negotiation properly. This situation results in intermittently slow performance from some workstations.

Explanation

If the auto-negotiate function of a NIC or LAN switch device is enabled and network bandwidth does not perform auto-negotiation properly, you might need to set the end-node devices manually. If only one device is set to manual, auto-negotiation on the link is disabled; and the other device cannot auto-negotiate. This configuration causes auto-negotiate to incorrectly establish duplex settings which results in the network connection running at a fraction of the rated speed.

Resolution

Disable the auto-negotiate feature on the LAN switch and set all connected devices to the same settings. Be sure you set both nodes to a speed and duplex setting that is compatible with the network media components in use. Do not assume that the network wiring or distribution system can support 100Mbps network speeds unless the system is fully qualified and certified to do so.

In addition, note that most hubs cannot support full duplex traffic. If network hubs are in use, the link must run at half-duplex and at the speed specified by the hub port. Some hubs can mix and match 10 and 100 speed network connections but many older hubs cannot. Be sure to confirm all component specifications before manually setting any end nodes.

Networking Performance Issues

Network Card / Driver Anomalies

Reported Issue

The performance of routine functions varies in unexpected ways and no single cause can be identified. Bandwidth tests result in inconsistent readings even if network loading is very light.

Explanation

Network cards and their hardware or software status indicators typically indicate the LAN connection speed and change state when traffic and collisions are detected. These indicators do NOT indicate the amount of delay involved in the card (or the card's driver) and its interface to the operating system and the computer itself. However, the inherent delays limit the maximum throughput that the card can achieve.

Design characteristics and hardware condition can affect NIC performance in unexpected ways. Throughput of a card is always somewhat less than the actual data rate shown on the status indicator. If a card experiences a partial failure, is using a defective driver, or is of poor design, actual throughput might be unstable and/or much less than expected. A NIC's throughput can be examined by using the native Windows® ping command as described below.

All Windows 9x and newer systems with the TCP/IP installed can use the ping command as a basic troubleshooting and diagnostic tool. In the example below, we run the ping command using the following parameters:

```
ping 192.168.100.195 -n 25 -l ####
```

where #### is the payload length as a number between 1 and 65500 defining the size of the data payload you wish to use for the connection test. NetWare servers do not respond to ping command with a payload length greater than approximately 10,000.

When the ping test is complete, a summary displays the average round-trip time in milliseconds (ms) and the amount of data loss as a percentage of the total data sent. Changing the size of the data payload during the ping test can reveal a problem in the card's behavior, as described in the table below. The table contains the results of the ping command using various payload sizes on one problematic NIC while running at 100BaseT under Windows 98.

Example of Data Loss Versus Data Payload Size with Defective Network Interface Card				
Payload Size		**Average Data Loss**	**Average Turnaround Time**	**Comments**
Payloads sized larger than maximum Ethernet packet size; Data sent as multiple packets	8192	0%	2ms	No data loss; fast turnaround time
	8100	5%	1ms	**Some data loss; fast turnaround time**
	8000	50%	473ms	**Consistent data loss; slow operation**
	7900	45%	699ms	**Consistent data loss; slow operation**
	7800	65%	264ms	**Consistent data loss; slow operation**
	7000	0%	2ms	No data loss; fast turnaround time
	6000	0%	1ms	No data loss; fast turnaround time
	5000	55%	446ms	**Consistent data loss; slow operation**
	4096	0%	1ms	No data loss; fast turnaround time
	3000	0%	1ms	No data loss; fast turnaround time
	2500	20%	340ms	**Consistent data loss; slow operation**
	2048	65%	177ms	**Consistent data loss; slow operation**
	2000	60%	282ms	**Consistent data loss; slow operation**
Payloads smaller than the max packet size. Data sent as one packet.	1500	0%	0ms	No data loss; instantaneous response
	1200	0%	0ms	No data loss; instantaneous response
	800	0%	0ms	No data loss; instantaneous response
	400	0%	0ms	No data loss; Instantaneous response
	200	0%	0ms	No data loss; Instantaneous response
	100	0%	0ms	No data loss; Instantaneous response
	64	0%	0ms	No data loss; Instantaneous response

The conclusion is that not all network cards are created equal. A card can connect to either a 10BaseT or a 100BaseT network and light up the associated speed indicator. However, just because the indicator comes on, there is no assurance that the card is capable of delivering data to or from the network at the data rate of the connection.

Some network cards rely on the computer's CPU to handle network data and depend on the speed of the computer and the operating system to deliver and retrieve data from the card. In addition, a card might not always work properly, although it is able to communicate on the network. Cards can fail and still function in a degraded manner.

In the case noted above, the network card is an Ethernet card. Ethernet specifications define that the maximum packet size allowed on the wire is 1518 bytes. This card works properly with a 1500-byte payload size and can generate large Ethernet packets properly. The ping command shows that the problem is most likely in the card's hardware or driver because it is unable to properly buffer some large payload sizes. However, the card itself could generate any size of Ethernet packet and place it on the LAN without difficulty.

Resolution

The implication of these observations is that some features of an application using a network might use certain payload sizes that can lead to performance problems when the network is not working properly. In our SASIxp / NCS ABACUSxp software tests, some of the print jobs always work well while others are not reliable. In the case of unreliable print jobs, looking at a capture of the network traffic reveals a large variety of payload sizes, many of which are larger than the maximum Ethernet packet size of 1518. These payloads must be disassembled, sent as multiple TCP messages, and then reassembled at the destination. If the card and/or the driver have difficulty performing the disassembly or reassembly of the messages, the application performs poorly, intermittently slows down, or even crashes.

Test your network using ping (IP-Address) -n 25 -l #### as described above.

1. When using the ping command, vary the payload size to confirm that any size payload can be carried over the network without data loss or excessive turnaround time. See the table of Packet Sizes and WAN Speeds at the end of this document for typical values.
2. Check the specifications of the NIC to determine if there are some limitations on expected performance under certain conditions. For example, some NICs use a bus-mastering architecture that increases the data transfer speeds between the computer and the network without burdening the PC's processor. In the case of the card mentioned above, the specifications state that bus-mastering models bring PCI-based performance to your computer in both 10Mbps and 100Mbps network environments. This 32-bit PC card claims to deliver up to 80Mbps networking speeds, while their 16-bit PC Cards deliver a maximum of 20Mbps. These specifications of course assume that the card is configured and working properly.
3. Ensure the card is supported by and running the latest drivers for the host operating system and computer.

Note: A fully switched, state of the art network can still have performance issues not related to the network itself. Problems can be caused by incompatible operating systems and NICs, incorrect NIC drivers, and bad NICs and auto-negotiation failures.

After upgrading a Novell Netware 6.5 server with post RTM service packs or patches, the SASIxp software does not launch.

Subject:
After upgrading a Novell® NetWare® 6.5 server with post RTM service packs or patches, the SASIxp software might not launch from a Macintosh® workstation

Description:
After upgrading a Novell Netware 6.5 server with post RTM service packs or patches, the SASIxp software would not launch from a Macintosh workstation. The Macintosh executables are no longer recognized as Macintosh binaries.

Solution:
Reinstall the SASIxp software from a Macintosh workstation. If you had previously applied post-release patches to the SASIxp software, those patches must be reapplied. Note: To prevent accidental loss of data, Pearson Digital Learning recommends that you perform a complete backup of your entire SASIxp folder prior to any updates or changes.

Mac OS® X operating system does not properly communicate with a Novell NetWare 6.5 Server.

Subject:

Mac OS® X operating system does not properly communicate with a Novell NetWare 6.5 Server. (Note: this is not an officially supported solution, use at your own risk.)

Description:

Novell NetWare 6.5 AFP3 protocol does not properly communicate with Mac OS X operating systems. AFP3 protocol must be replaced with a down-level AFP protocol from NetWare 6.0.

Note: This solution may or may not work in your environment. You should contact Novell support prior to implementing this work around. Pearson Digital Learning currently does not support SASIxp on an Mac OS X platform with Netware 6.5.

Solution:

To allow the SASIxp software to run on a Mac OS X machine from a NetWare 6.5 server with AFP3, you must replace the AFPTCP.NLM and enable a down-level AFP login sequence on the NetWare 6.5 server. The required files are available on NetWare 6.0 servers with SP3 applied and remain on the 6.5 server if it is upgraded from NetWare 6.0 SP3. Otherwise, these files must be acquired from a NetWare 6.0 SP3 or later server.

Important: Choose the appropriate Procedure A or B and then complete Procedure C.

Procedure A

This procedure describes how to repair a new NetWare 6.5 server that was NOT upgraded from 6.0.

1. On a NetWare 6.0 SP3 server, copy the folder *afp* from PUBLIC\nmas\methods.
2. On the new NetWare 6.5 server, paste the entire *afp* folder to the same path in step 1 (PUBLIC\nmas\methods).
3. From the \SYSTEM folder of the NetWare 6.0 SP3 server, copy the file AFPTCP.NLM.
4. On the 6.5 server, locate the existing AFPTCP.NLM file and rename it AFPTCP_65.NLM.
5. Copy the AFPTCP.NLM file from the NetWare 6.0 SP3 server and paste the file in the \SYSTEM folder of the NetWare 6.5 server.

Procedure B

This procedure describes how to repair an upgraded NetWare 6.5 server that was upgraded from NetWare 6.0 SP3.

1. From the \SYSTEM folder of the NetWare 6.0 SP3 server, copy the file AFPTCP.NLM.
2. On the NetWare 6.5 server, locate the existing AFPTCP.NLM file and rename it AFPTCP_65.NLM.
3. Copy the AFPTCP.NLM file from the NetWare 6.0 SP3 server and paste the file in the \SYSTEM folder of the NetWare 6.5 server.

Procedure C

When you have completed Procedure A or B and depending on which authentication methods you use to connect to your server, you might need to perform this procedure on the NetWare 6.5 server whether or not the NetWare 6.5 server was an upgrade or a new installation.

1. On the Netware 6.5 server, open Console One and authenticate to Novell Directory Services (NDS).
2. Select Security container in the OU.
3. Select Authorized Login Methods.
4. Right-click and select New | Object | SAS:NMAS Login Method.
5. In the \Public\nmas\methods folder, locate the *afp* folder. Note: The *afp* folder remains from the 6.0 upgrade or was added in Procedure A.
6. Double-click the *afp* folder.
7. Select the config.txt file and complete the installation of the method.
8. From a workstation with Internet Explorer 6.0 or later, open the iManager page at https://NW65serverIPaddress:2200 (or the non-default port on which iManager is running.)
9. Authenticate to NDS.
10. On the opening page, select Network Management, then select iManager.
11. On the next page in the upper right hand corner, select Open iManager.

12. When iManager opens, selectDirectory Administration.
13. Select Modify User and drill through the tree to the Macintosh® user.
14. Select the Macintosh user.
15. Select the NMAS Login Sequences tab.
16. Select the Login Sequences link.
17. Set Default Login Sequence to Simple Password. Note: lsmafp is included in the list of authorized login sequences.
18. Select the NMAS Login Methods tab.
19. Select the Simple Password link.
20. Set the simple password on the account. Note that the password must be eight (8) characters or less to allow password entry from a Macintosh computer.

Log in from the Macintosh computer using UserName.Ouname and the simple password.

(PSS-26)

Macintosh operating systems do not authenticate to a W2003 server.

Subject:

Macintosh operating systems do not authenticate to a W2003 server.

Description:

The default authentication level for AFP connections to W2003 servers is Microsoft® only. Macintosh systems cannot authenticate.

Solution:

Low Security Method

Change the authentication method for AFP connections to W2003 servers to Apple Clear Text and Microsoft under Computer Management | Shared Folders | Configure File Server for Macintosh | Security | Enable authentication:.

High Security Method

Download from Microsoft® and install on your Macintosh systems the appropriate Microsoft User Authentication Module (MSUAM). This installation allows your Macintosh systems to authenticate to a Windows server using Strong encryption (NTLMv2). Verify the authentication method for AFP connections to W2003 servers is set to Microsoft only under Computer Management | Shared Folders | Configure File Server for Macintosh | Security | Enable authentication:.

(PSS-25, 73)

SASIxp software does not work on a Mac OS® X client when installed on a Novell NetWare 6.5 Server.

Subject:

SASIxp software does not work on a Mac OS® X client when installed on a Novell NetWare 6.5 Server. (Note: this is not an officially supported solution, use at your own risk.)

Description:

Novell NetWare 6.5 AFP3 protocol does not properly communicate with Mac OS X operating systems. AFP3 protocol must be replaced with a down-level AFP protocol from NetWare 6.0.

Note: This solution may or may not work in your environment. You should contact Novell support prior to implementing this work around. Pearson Digital Learning currently does not support SASIxp on a Mac OS X platform with Netware 6.5.

Solution:

To allow the SASIxp software to run on a Mac OS X machine from a NetWare 6.5 server with AFP3, you must replace the AFPTCP.NLM and enable a down-level AFP login sequence on the NetWare 6.5 server. The required files are available on NetWare 6.0 servers with SP3 applied and remain on the 6.5 server if it is upgraded from NetWare 6.0 SP3. Otherwise, these files must be acquired from a NetWare 6.0 SP3 or later server.

Important: Choose the appropriate Procedure A or B and then complete Procedure C.

Procedure A

This procedure describes how to repair a new NetWare 6.5 server that was NOT upgraded from 6.0.

6. On a NetWare 6.0 SP3 server, copy the folder *afp* from PUBLIC\nmas\methods.
7. On the new NetWare 6.5 server, paste the entire *afp* folder to the same path in step 1 (PUBLIC\nmas\methods).
8. From the \SYSTEM folder of the NetWare 6.0 SP3 server, copy the file AFPTCP.NLM.
9. On the 6.5 server, locate the existing AFPTCP.NLM file and rename it AFPTCP_65.NLM.
10. Copy the AFPTCP.NLM file from the NetWare 6.0 SP3 server and paste the file in the \SYSTEM folder of the NetWare 6.5 server.

Procedure B

This procedure describes how to repair an upgraded NetWare 6.5 server that was upgraded from NetWare 6.0 SP3.

4. From the \SYSTEM folder of the NetWare 6.0 SP3 server, copy the file AFPTCP.NLM.
5. On the NetWare 6.5 server, locate the existing AFPTCP.NLM file and rename it AFPTCP_65.NLM.
6. Copy the AFPTCP.NLM file from the NetWare 6.0 SP3 server and paste the file in the \SYSTEM folder of the NetWare 6.5 server.

Procedure C

When you have completed Procedure A or B and depending on which authentication methods you use to connect to your server, you might need to perform this procedure on the NetWare 6.5 server whether or not the NetWare 6.5 server was an upgrade or a new installation.

21. On the Netware 6.5 server, open Console One and authenticate to Novell Directory Services (NDS).
22. Select Security container in the OU.
23. Select Authorized Login Methods.
24. Right-click and select New | Object | SAS:NMAS Login Method.
25. In the \Public\nmas\methods folder, locate the *afp* folder. Note: The *afp* folder remains from the 6.0 upgrade or was added in Procedure A.
26. Double-click the *afp* folder.
27. Select the config.txt file and complete the installation of the method.
28. From a workstation with Internet Explorer 6.0 or later, open the iManager page at https://NW65serverIPaddress:2200 (or the non-default port on which iManager is running.)
29. Authenticate to NDS.
30. On the opening page, select Network Management, then select iManager.
31. On the next page in the upper right hand corner, select Open iManager.
32. When iManager opens, selectDirectory Administration.

33. Select Modify User and drill through the tree to the Macintosh® user.
34. Select the Macintosh user.
35. Select the NMAS Login Sequences tab.
36. Select the Login Sequences link.
37. Set Default Login Sequence to Simple Password. Note: lsmafp is included in the list of authorized login sequences.
38. Select the NMAS Login Methods tab.
39. Select the Simple Password link.
40. Set the simple password on the account. Note that the password must be eight (8) characters or less to allow password entry from a Macintosh computer.

Log in from the Macintosh computer using UserName.Ouname and the simple password.

(PSS-27)

Scanning with the SASIxp software on a Mac OS® 9.2x workstation using the Keyspan USB to serial converter requires Keyspan driver revision 1.9 or later.

Subject:

Scanning with the SASIxp software on a Mac OS® 9.2x workstation using the Keyspan USB to serial converter requires Keyspan driver revision 1.9 or later.

Solution:

The new Keyspan driver is available at http://keyspan.com.

Novell® Client32™ Redirector Configuration Recommendations

Reported Issue

Using Novell Client for NetWare® versions 3.31 and 3.32 in their native condition causes data corruption problems with a number of software packages, including the SASIxp / NCS ABACUSxp software. Data corruption has been observed in various software packages, including FoxPro for DOS 2.6, Microsoft® Access, Great Plains Accounting software for DOS, Intuit® Quicken®, SASIxp, NCS ABACUSxp, and CLASSROOMxp™ software.

Explanation

Specifically, Pearson Digital Learning has observed data corruption and/or loss of data in the SASIxp database AGRD (Grade Reporting) and AGRL (Grade Reporting Detail) files during the Update Grades process and in the ACHS (Course History) file when running the Reorganize Files file maintenance utility.

Our testing indicates that failures due to the Novell Client32 problem noted above can display symptoms such as

- Unexplained data loss in the SASIxp database
- Program errors and General Protection Faults (GPF) during grade report printing
- "1 file skipped because errors occurred while reorganizing it" message when running the Reorganize Files utility

Resolution

All SASIxp, NCS ABACUSxp, and CLASSROOMxp software users who are running the Windows 95 or the Windows 98 Novell 32bit Client for NetWare versions 3.31 or 3.32 should contact the Novell support Web site at support.novell.com and **upgrade to the latest client**. If you must continue to use 3.31 or 3.32 clients, download and apply the latest Support Pack and any additional client patches. In any case, you MUST apply at least SP1 (client 3.30 requires SP3) to these outdated clients.

Note: **Reinstallation of the Novell Client32 redirector causes all Advanced Settings to reset to their original default values.** After updating or installing a different Novell client, please insure that the following configuration options are set in the Advanced Settings section of the client properties.

Note: Not all options are available on all client versions. See the following table for Novell Client 32 Advanced Configuration Recommendations for the SASIxp / NCS ABACUSxp software.

Novell Client32 Advanced Configuration Recommendations for SASIxp / NCS ABACUSxp Software			
Setting	**Windows 95 Windows 98**	**Windows NT® Windows 2000 Windows XP**	**Description**
Opportunistic Locking	Disable at the server (See the Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers section in this document.)		If enabled, opportunistic locking allows the client to detect opportunities to exclusively cache network files locally.
Burst Mode	N/A	0 (Off)	The Burst Mode parameter controls the use of the Packet Burst protocol for file read/write. Generally, Packet Burst reduces overall network traffic and improves performance.
Cache Writes	Off	N/A	Improves performance for writing files to the network by allowing the client to save changes to workstation memory before saving them to the network. If this is disabled, then the Novell client must submit the file write changes to the server before being allowed to continue
File Cache Level	0 (Off)	N/A	Specifies the type of file caching used at the client. The larger the value, the more aggressive the client is in caching files and the better the performance.
File Caching	N/A	Off	
File Commit	N/A	1 (On)	File Commit controls whether buffers flushed by an application are committed immediately to disk on the server. Setting this value to On, ensures data integrity at the expense of significantly reduced file write performance. When On, the client must immediately commit the file changes to disk on the server and must wait until the server acknowledges that the changes have been written. This parameter is an implementation of the True Commit functionality used in the Windows 95 /Windows 98 Novell Clients.
File Write Through	Off	N/A	Controls whether or not all files are opened in write-through mode
Large Internet Packets	Off		When Large Internet Packets is On, it uses the maximum packet size negotiated between the NetWare server and the workstation, even across routers, bridges, and switches. If the maximum packet size supported by the network is smaller than the negotiated packet size, the size supported by the network is used.
Packet Burst	Off	N/A	The Packet Burst parameter controls the use of the Packet Burst protocol for file read/write.
True Commit	On	N/A	True Commit controls whether buffers flushed by an application are committed immediately to disk on the server. Setting the True Commit value to On, ensures data integrity at the expense of significantly reduced file write performance. When On, the client must immediately commit the file changes to disk on the server and must wait until the server acknowledges that the changes have been written. This parameter is an implementation of the File Commit functionality used in the Windows NT Novell Client.

Loss of communications might occur between Microsoft Windows XP clients and Novell server after installing Windows updates to the Windows XP client.

Subject:

Loss of communications might occur between Microsoft Windows XP clients and Novell server after installing Windows updates to the Windows XP client.

Description:

A customer reported that after the installation of Microsoft Windows XP upgrades (upgrade version unknown), the Windows XP client could no longer communicate with the Novell server using IPX. Pearson Digital Learning has not verified this issue.

Solution:

IPX network protocol had been removed. Reinstall the IPX network protocol on the Microsoft Windows XP client system.

(PSS-40)

Files Left Open by SASIxp, NCS ABACUSxp, or CLASSROOMxp™ Software on a NetWare® Server

Reported Issue

With oplocks disabled at the NetWare server, Windows® 9x, Windows NT® 4.0 Workstation, and Windows 2000 Professional clients, close all files at the server when the user exits the SASIxp, NCS ABACUSxp, or CLASSROOMxp software.

With oplocks enabled, Windows 9x clients close all files at the server when the user exits the SASIxp, NCS ABACUSxp, or CLASSROOMxp software. Windows NT 4.0 Workstation and Windows 2000 Professional clients close some files when the user exits the SASIxp, NCS ABACUSxp, or CLASSROOMxp software. The server closes the remaining files within 30 seconds.

Explanation

Abnormal network conditions can cause delays in client / server communication. If the client that has an oplock on one or more open files cannot be contacted by the server when another client requests one of the open files, the server sends several “oplock break” commands to the client that originally opened the file. If these commands go unanswered, the server eventually closes the files and offers them to the requesting client. This process can take up to 40 seconds per file.

Another abnormal condition is when the SASIxp, NCS ABACUSxp, or CLASSROOMxp software client PC locks up or freezes due to any number of reasons, including an access violation, Dr. Watson error, network error, or hardware failure. Also, users frequently become impatient when waiting for a task to complete and might mistake these time delays as a computer lockup. Users often perform Ctrl+Alt+Del followed by End Task in an attempt to close the program and clear what they perceive to be a problem with their computer.

Performing Ctrl+Alt+Del followed by End Task on a Windows NT 4.0 Workstation and Windows 2000 Professional clients exits the SASIxp, NCS ABACUSxp, or CLASSROOMxp software program properly and immediately closes all files at the server. Performing Ctrl+Alt+Del followed by End Task on a Windows 9x operating system exits the SASIxp, NCS ABACUSxp, or CLASSROOMxp software’s Graphical User Interface (GUI) but does not completely close the SASIxp, NCS ABACUSxp, or CLASSROOMxp software program on the client. When a user performs an additional Ctrl+Alt+Del, the Close Program window still shows SASIxp / NCS ABACUSxp software as an open program. All files remain open on the server. Launching SASIxp, NCS ABACUSxp, or CLASSROOMxp software again on the same machine while the program is not fully closed can cause false error messages.

Resolution

If a user performs Ctrl+Alt+Del followed by End Task on a Windows 9x client, that user should reboot the client PC. In addition, oplocks should be disabled on all Novell clients or preferably at the NetWare or Windows server itself. (See Opportunistic Locking on SASIxp / NCS ABACUSxp Software Servers in this document for details on disabling oplocks on NetWare and Windows servers.)

Windows 9x users should always properly exit the SASIxp / NCS ABACUSxp / CLASSROOMxp software. If users cannot properly exit the program or if they have used Ctrl+Alt+Del followed by End Task to terminate the SASIxp NCS ABACUSxp / CLASSROOMxp software, they should always reboot their workstation.

SASIxp™ / NCS ABACUSxp™ Software and Novell® / Windows® Clients Reported Issue

Network Interface Card (NIC) Issues

Microsoft® has identified problems with Realtek NIC drivers that shipped on the Windows 98 CD. These drivers can cause data corruption. If you use a Realtek network adapter, the network adapter might send an occasional corrupt data packet. This can occur if you are using the Rtl8029.sys driver that is included with Windows 98.

The original drivers included with Windows 98 are

- Rtl8029.sys 35,168 bytes
- Rtl8129.sys 23,552 bytes

To resolve this issue, download an updated driver for your Realtek network adapter from the Realtek Web site at http://www.realtek.com.tw.

Client Software

Both Microsoft and Novell provide client software. This software allows a client workstation to communicate with a server. The software knows how to redirect communications from the workstation to either its own local hard drive or to the server, depending on the user's or the application's requirements. In technical terms, the client package is sometimes referred to as a redirector.

Client redirector software is critical to proper network operation. Several versions of client software are available and many have been shown to cause data corruption when connecting to SASIxp / NCS ABACUSxp databases. The minimum acceptable Microsoft client software which should be used with SASIxp, NCS ABACUSxp, and CLASSROOMxp™ software can be identified as shown in the following table.

Microsoft Client Software (Redirectors)			
Product	**Operating System**	**Name / Version**	**Notes**
Client for Microsoft Networks	Windows 95 Windows 95 OEM Service Release 2 (OSR2) Windows 95 OEM Service Release 2.1 (OSR2.1)	Vredir.vxd 4.00.1116	Add and set Registry value: HKLM/System/CurentControlSet/Services/ VxD/VREDIR/DiscardCacheOnOpen=01 (hex, binary value) If this value is not present or is set to 0, this update behaves the same as Vredir.vxd versions 4.00.955 and earlier. This value is not added by default and must be added manually in order to disable caching when opening files.
	Windows 98	4.10.2149 4.10.2222	
	Windows NT® Windows 2000 Windows XP	N/A	Apply latest service pack.
Client for Novell Networks	Windows 95 Windows 95 OSR2, Windows 95 OSR2.1	Nwredir.vxd 4.00.1113	Must upgrade to Windows at least Windows 98 SE or later.
	Windows 98 Windows SE	4.10.2224	Add and set Registry value: HKLM/System/CurentControlSet/Services/ VxD/VREDIR/DiscardCacheOnOpen=01 (hex, binary value) If this value is not present or is set to 0, this update behaves the same as Vredir.vxd versions 4.00.955 and earlier. This value is not added by default and must be added manually in order to disable caching when opening files.
	Windows NT Windows 2000 Windows XP	N/A	Apply latest available service pack.

Large school districts can have several thousand files in the district's copy of the SASIxp | Datafile directory. If the district server is running with installation defaults, the directory cache buffers might not be sufficient to provide adequate performance. Increasing the settings for Minimum Directory Cache Buffers and Maximum Directory Cache Buffers can improve performance in large SASIxp / NCS ABACUSxp software environments.

Part 1 –Required Patches

Ensure the server operating system is running with the minimum required patches before making any changes to the server environment. Minimum patch requirements for Novell® products can be found at: http://support.novell.com/misc/patlst.htm.

Part 2 – General Recommendations for Heavily Used NetWare Servers

(Summarized from various Novell TIDs).

This section describes bottlenecks that can result from insufficient allocation of server resources, specifically packet receive buffers, directory cache buffers, and service processes.

Resources available on a server can be divided into three classes: LAN, Disk, and Processor. LAN and Disk resources refer to the number of buffers available, while Processor resources refer to the number of service processes available. As a network packet arrives or a disk read or write is done, there should be a buffer available for the data. If there is a buffer available, there should be a service process available to deal with it. Running out of any one of these resources for more than a brief period causes high utilization on the server and delay for the users.

Novell General Recommendations for the Settings

Use either MONITOR, Server parameters or SERVMAN, Server parameters, or edit the STARTUP.NCF file directly.

> **Note:** Default values and value ranges are provided in Novell's documentation. Recommended values for SASIxp / NCS ABACUSxp software servers display on the line with the command.

Communication Parameters

Communication parameters control settings for communication buffers. Packet receive buffers are areas in the server's memory that are set aside to hold incoming data packets. The packets remain in the buffers while the server processes them.

SET MINIMUM PACKET RECEIVE BUFFERS = # (2-3 per connection)

Specifies the minimum number of packet receive buffers the operating system allocates as soon as the server boots. You must add this command to the STARTUP.NCF file. You cannot change the setting at the console prompt. This should be based on the number of user connections, including other server and application connections, usually attached to that server. It is not the NetWare user license number on the server.

This value can range from 10 to 20000. The default is 50. (NW 5.1)
10 to 20000. The default is 500. (NW 6.0)
10 to 32768. The default is 2000. (NW 6.5)

SET MAXIMUM PACKET RECEIVE BUFFERS = 4000

Specifies the maximum number of packet receive buffers the operating system can allocate.

This value can range from	50 to 25000.	The default is 100.	(NW 5.1)
	50 to 25000.	The default is 5000.	(NW 6.0)
	50 to 3303820.	The default is 10000.	(NW 6.5)

SET NEW PACKET RECEIVE BUFFER WAIT TIME = 0.1

Specifies how long the operating system waits after receiving a request for a packet receive buffer before granting a new buffer. This parameter prevents the system from granting too many buffers during a sudden peak in usage.

This value can range from	0.1 to 20 seconds. The default is 0.1. (NW 5.1)
	0.1 to 20 seconds. The default is 0.1. (NW 6.0)
	0.1 to 20 seconds. The default is 0. (NW 6.5)

Directory Caching Parameters

File caching allows faster access to frequently used files by holding a file (or a portion of it) in memory. Files being read from or written to are kept in file cache buffers. In a similar manner, directory caching allows fast access to frequently used directories. A directory cache buffer is a portion of NetWare server memory that holds entries from the directory table.

As directory cache buffers increase, file cache buffers decrease. A tradeoff exists between directory caching and file caching. Directory caching and file caching must be balanced carefully for maximum performance. If you adjust the system to use too much memory for directory caching, you can leave too little memory for file caching, and vice versa.

SET MINIMUM DIRECTORY CACHE BUFFERS = # (2-3 per connection)

Specifies the minimum number of cache buffers that the system allocates for directory caching.

This value can range from	10 to 2000.	The default is 20.	(NW 5.1)
	10 to 2000.	The default is 20.	(NW 6.0)
	10 to 100000.	The default is 500.	(NW 6.5)

SET MAXIMUM DIRECTORY CACHE BUFFERS = 4000

Specifies the maximum number of cache buffers that the system can allocate for directory caching. This parameter keeps the system from allocating too many directory cache buffers so that memory is available for other server processes.

This value can range from	20 to 4000.	The default is 500	(NW 5.1)
	20 to 4000.	The default is 500	(NW 6.0)
	20 to 200000.	The default is 2000.	(NW 6.5)

SET DIRECTORY CACHE ALLOCATION WAIT TIME = 0.5

Specifies how long the system must wait after allocating a new directory cache buffer before it can allocate another buffer. During this time, all requests for a new directory-cache buffer are ignored. If the wait time is too low, peak usage requests cause more resources than necessary to be allocated to directory caching. If the wait time is too high, the system is very slow in allocating the directory cache buffers necessary to service the usual number of directory requests. If directory searches seem slow even after the server has been running for 15 minutes, you might want to decrease this parameter.

This value can range from	0.5 to 120 seconds. The default is 2.2 (NW 5.1, 6.0, 6.5)

Service Processes

SET MINIMUM SERVICE PROCESSES = # (1 per connection)
Specifies the minimum number of service processes the operating system can create without having to wait for the time specified by the New Service Process Wait Time parameter. If your server typically has at least 100–150 connections daily, download the **wrkthd.exe** file from: http://support.novell.com/search. Use workthrd.nlm prior to setting your maximum service processes.

This value can range from	10 to 500.	The default is 10.	(NW 5.1)
	10 to 500.	The default is 10.	(NW 6.0)
	10 to 3000.	The default is 100.	(NW 6.5)

SET MAXIMUM SERVICE PROCESSES = 1000
Specifies the maximum number of service processes that the operating system can create. (View the number of service processes in MONITOR.) Decrease this parameter temporarily if the server is low on memory. If the server is always low on memory, add physical memory. Increase this parameter if the number of service processes is at the maximum. Increasing this number helps only if more than 20 requests are being delayed simultaneously for a disk I/O to be completed.

This value can range from	5 to 1000.	The default is 40.	(NW 5.1)
	5 to 1000.	The default is 40.	(NW 6.0)
	50 to 5000.	The default is 500.	(NW 6.5)

SET NEW SERVICE PROCESS WAIT TIME = 0.3
Specifies how long the system should wait to make an allocation when it receives a request for another service process.

This value can range from 0.3 to 20 seconds. The default is 2.2 (NW 5.1, 6.0, 6.5)

It is easiest to set these using the Servman console utility. The SET MAXIMUM settings take effect immediately, while SET MINIMUM settings take effect at the next boot.

Of course, these are general recommendations only, and might need to be varied depending on the usage pattern of the server. For example, a server that has a large number of heavy disk users might need more directory cache buffers. The Monitor screen shows you which users are hitting their maximum value when the utilization hits 100%. You can also look at the Scheduling Information screen or the Processor Utilization screen (select it and press F3) to see which actual process or processes are using the most processor time.

NetWare Turbo File Allocation Feature (FAT) Feature
(NetWare 5.1, 6.0, 6.5 Running Traditional Volumes)

Some timing conditions due to multiple client access to a single file, especially large files, can corrupt the Turbo FAT feature on the NetWare file server. To minimize the possibility of data corruption at the server, you should disable the Turbo FAT feature on NetWare file servers.

Consult the Novell Web site at http://support.novell.com, search the knowledgebase for TID Number 2960009, and download the turbofat.exe file. Load this file to your server, execute it, and follow the directions provided in the included documentation. Apply the turbodis.nlm as directed for your particular server.

ParentCONNECTxp Admin App cannot locate a valid index for the ASCH file during school import.

Subject:

When importing schools in the ParentCONNECTxp Admin App, the message “An error has occurred attempting to read the list of schools from the SASIxp™ data files. Description: Index file not found” might display The error occurs because of the existence of an ASCH.INF file in the SASIxp Datafile folder.

Description:

Users sometimes open certain SASIxp data files with Microsoft® Access. Some versions of Microsoft Access can create a file in the Datafile folder with a .inf extension. This .inf file contains path information that might be invalid. If the path information is invalid, the Microsoft Data Access Object (DAO) that ParentCONNECTxp uses for connecting to the SASIxp database fails as described above.

DAO, like Access, first looks for a type .inf file when attempting to access a DB4 file. The contents of this file are supposed to point DAO to the location of the index files (.mdx, .ldx, and so on.) of the requested DB4 table. If the .inf file exists, then DAO attempts to access the index files by the path referenced in the .inf file. If the .inf file does not exist, DAO assumes that the index files reside in the same directory as the database file.

Solution:

The .inf files are automatically created by some versions of Microsoft Access when using Access to create an Access database with external table linkages to DB4 files. The path that Access uses to define the settings in the .inf file is based on the system that was running Access and not the system hosting the DB4 files. An error occurs if the path defined in the .inf file is not valid for the system running the AdminApp program.

The simple resolution is to remove the .inf files from the Datafile folder. However, the next time someone runs Microsoft Access on the DB4 database, the .inf files might reappear.

A long-term solution is to ensure the paths used by the Access routines are valid for the systems running AdminApp

(PSS-108)

SASIxp / NCS ABACUSxp Central Enrollment Does Not Function

Reported Issue

If NAT is implemented at the district, Central Enrollment does not function.

Explanation

A school implementing SASIxp District Integration and Central Enrollment typically uses a LAN to interconnect all locally networked computers and a WAN to interconnect schools with the district office.

The IP scheme on each LAN is designed to use an IP address range that is assigned for internal use only. The WAN is composed of direct-connected communications lines or a private-frame relay. In this scenario, the private IP addresses are routable between the sites and district servers so Central Enrollment works properly.

In some cases, it is necessary to use NAT. This could be required if (1) the WAN uses public IP addresses, (2) the WAN uses a public infrastructure, or (3) the local IP addressing schemes are duplicated.

When you use NAT at the district LAN in a SASIxp environment, Central Enrollment fails. SASIxp workstations initially locate a task server's address by interrogating the sasixp.ini file. The SASIxp software uses the task server's address from the sasixp.ini file to initiate communication; however, for subsequent communication, the SASIxp software uses information from within the returned data packet to determine the task server's address. If the task server is on a LAN that is using NAT, the returned address inside the data packet is a local, internal, non-routable address on the district LAN. The school workstation attempts to use this internal address for subsequent communications to the task server and communication, task server, and enrollment attempt fail.

Resolution

Do not implement NAT at the district office LAN where the district and task server computers reside. The IP address of all task servers must be an external, routable address that can be directly reached by all SASIxp school workstations.

NAT at the school does not adversely affect Central Enrollment. However, if NAT is required at the district, the task server could be located in the DMZ. Please note that in a DMZ scenario, it is imperative that you take steps to ensure that only authorized workstations can access the task server. Typically this is accomplished via access lists in the firewall.

Lost or corrupted data, most likely Attendance data.

Subject:
Lost or corrupted attendance data. Other lost or corrupted data within the SASIxp database.

Description:
Mixed versions of SASIxp.exe or Classxp.exe programs that use the same SASIxp database will cause data loss and / or data corruption.

This situation frequently occurs when local copies of SASIxp and CLASSxp programs are installed on user workstations in an attempt to decrease network traffic or increase application performance. This practice is not recommended by Pearson School Systems because

- It is not particularly effective.
- It creates an unnecessarily complex maintenance situation for the system administrators when applying service releases or version upgrades to the SASIxp and CLASSxp software.
- It creates a situation where data loss within the SASIxp database is likely to occur because administrators frequently forget where all of their programs copies are located.

The problem is likely to occur when

- An upgrade or service release is applied and one or more of the workstations holding local copies of the application is left out of the upgrade process.
- In a cross platform configuration, some of the Mac binaries are left in a locked condition prior to the upgrade.

Either of these situations sets up an environment where the upgrade creates a mismatch of application versions running against the SASIxp database. The result is unpredictable operation of the application and unstable data in the database, often initially observed as but not limited to lost or incorrect attendance data.

Solution:
Pearson School Systems recommends that all user workstations have a drive mapped to a single shared SASIxp folder which contains one set of application and database files. Upgrades and service releases should be applied to this set of application and database files.

If the system configuration is such that multiple copies of the SASIxp and CLASSxp programs must exist on the network, the system administrator must make sure that all copies of the programs and program library files are from the same SASIxp and CLASSxp release and upgrade. In a cross-platform configuration, be sure to unlock all Mac binaries prior to performing an upgrade.

(PSS-107)

SASIxp / NCS ABACUSxp Query Launches Are Slow

Reported Issue

Launching SASIxp or NCS ABACUSxp query atoms on a Windows NT® 4.0 or Windows® 2000 server is slower on Windows NT, Windows 2000 Professional, and Windows XP Professional clients than on a Windows 98 workstation client.

Explanation

Searching a directory for file information with Windows 98 can take one or two seconds. This same function performed with a Windows NT, Windows 2000 Professional, or Windows XP Professional client can take in excess of 30 seconds. The reason for this delay is that the more .DBF files that exist in the Datafile folder, the longer the query launch takes on any client. The delayed effect is most pronounced on Windows NT, Windows 2000 Professional, and Windows XP Professional clients.

Resolution

There are two approaches to resolving this issue:

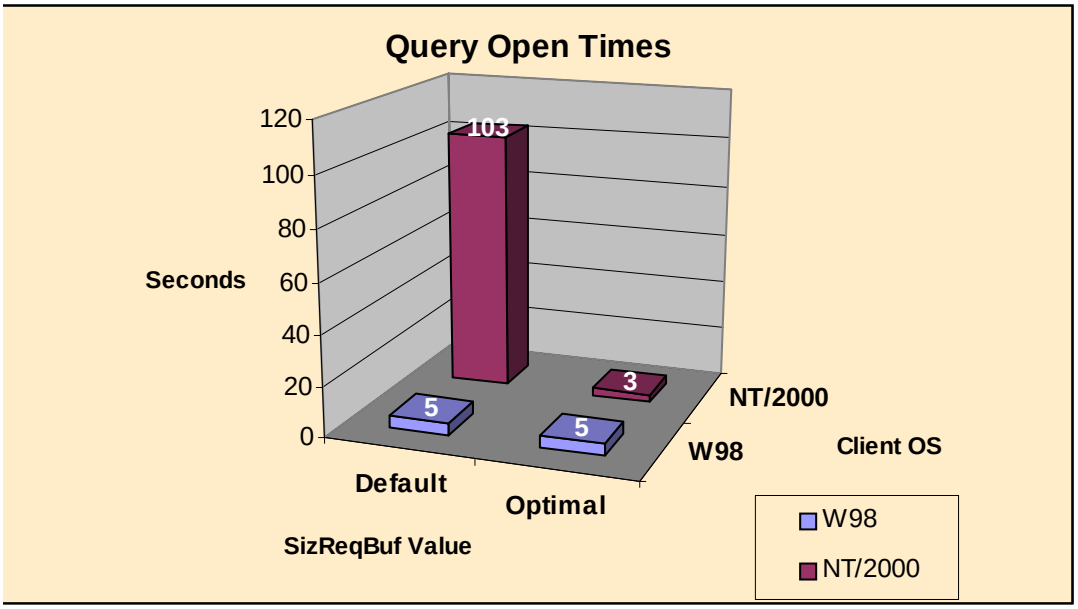
1. To minimize the delay, delete all Demo Data files if you are not using them. Also, delete any temp or history files from previous years in the Datafile directory and its subdirectories under Datafile. Contact Pearson Digital Learning Global Support for details on proper Datafile directory maintenance.
2. Modify the Windows NT 4 or Windows 2000 server's network data buffering characteristics to prevent unnecessary delays in acknowledging the 'dir' requests performed by the SASIxp or NCS ABACUSxp software when you open query atoms from Windows NT, Windows 2000 Professional, or Windows XP Professional clients. Make a new registry value REG_DWORD SizReqBuf = 14596 (decimal) and place it in the server's registry under key

   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters.

   For more information, see Microsoft® article number Q177266.

Recommendation: Ensure that the server and all workstations are running the most recent Microsoft Windows Service Pack version. If the workstations and the server are running the same operating system, ensure that the Microsoft Windows Service Pack applied to the workstation is the same version as that applied to the server.

Performance Data



SASIxp / NCS ABACUSxp software Query Open Times comparing Windows 98
and Windows 2000 Professional clients using a Windows NT 4.0 server with a default SizReqBuf setting of 4096
versus the optimal setting of 14596

SASIxp / NCS ABACUSxp Software Backups Are Slow

Reported Issue

The built-in backup function for SASIxp student administrative software and NCS ABACUSxp instructional management system is slower on a Windows NT® 4.0 or Windows® 2000 server supporting a Windows NT, Windows 2000 Professional, or Windows XP Professional client than a Windows NT 4.0 or Windows 2000 server supporting a Windows 98 workstation client.

Explanation

Searching a directory for file information with Windows 98 can take a second or two. This same function performed with a Windows NT, Windows 2000 Professional, or Windows XP Professional client can take in excess of 30 seconds. The reason for this delay is that the more files of any kind that exist in the SASIxp software folder, the longer the SASIxp / NCS ABACUSxp software backup takes on any client, but the effect is most pronounced on Windows NT, Windows 2000 Professional, and Windows XP Professional clients.

Resolution

There are two approaches to resolving this issue:

1. To minimize the delay, delete all Demo Data files if you are not using them. Also, delete any temp or history files from previous years in the Datafile directory and any subdirectories under Datafile. Contact Pearson Digital Learning Global Support for details on proper Datafile directory maintenance.

2. Modify the Windows NT 4 or Windows 2000 server's network data buffering characteristics to prevent unnecessary delays in acknowledging the 'dir' requests performed by the SASIxp / NCS ABACUSxp software when you open query atoms from Windows NT and Windows 2000 Professional clients. Make a new registry value REG_DWORD SizReqBuf = 14596 (decimal) and place it into the server's registry under key

   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters

   For more information, see Microsoft® article number Q177266.

Recommendation: Ensure that the server and all workstations are running the most recent Microsoft Windows Service Pack version. If the workstations and the server are running the same operating system, ensure that the Microsoft Windows Service Pack applied to the workstation is the same version as that applied to the server.

Performance Data

The difference in backup times between Windows NT and Windows 2000 Professional clients is too large to show on a graph. Our test database contains approximately 800 students and more than 12,000 files in 27 folders. With the default registry settings on the server, the backup atom opens in 64 seconds and the backup is about 2% complete after 30 minutes. Changing the server registry as described above allows the backup atom to open in three seconds and the entire backup completes in slightly over four minutes.

SASIxp File and Directory Permissions

The table below lists the minimum permissions that should be applied to a file server's SASIxp directory structure when used by typical SASIxp, NCS ABACUSxp, and CLASSROOMxp™ users. Power Users, Security Administrators, or other advanced users might require additional permissions.

Key:

C = Create
E = Read and Execute
F = File Scan
L = List
M = Modify
R = Read
W = Write

SASIxp Directories	NetWare® Permissions	Windows Permissions
SASIxp	R, F	R, E, L
BACKUP	N/A	N/A
DATAFILE	R, W, C, M, F	M, R, E, L
GXXXXXXXX [2]	R, W, C, M, F	M, R, E, L
EQEDITOR	R, F	R, E, L
MACRO	R, F	R, E, L
APPATOM	R, F	R, E, L
FILTER	R, F	R, E, L
MOLECULE	R, F	R, E, L
QUERY	R, F	R, E, L
RPTCSTM	R, F	R, E, L
RPTGRP	R, F	R, E, L
USER	R, F	R, E, L
DATAATOM	R, F (R, W, C, F, M) [1]	R, E, L (M, R, E,L W) [1]
FILTER	R, F (R, W, C, F, M) [1]	R, E, L (M, R, E,L W) [1]
INSTALL	R, F (R, W, C, F, M) [1]	R, E, L (M, R, E,L W) [1]
MOLECULE	R, F (R, W, C, F, M) [1]	R, E, L (M, R, E,L W) [1]
QUERY	R, F (R, W, C, F, M) [1]	R, E, L (M, R, E,L W) [1]
RPTCSTM	R, F (R, W, C, F, M) [1]	R, E, L (M, R, E,L W) [1]

[1] Required if SASIxp users are allowed to save queries, filters, etc., to their desktops.
[2] Required for NCS ABACUSxp users.

SASIxp, NCS ABACUSxp, CLASSROOMxp™ Suggestions Checklist

SASIxp, NCS ABACUSxp, or CLASSROOMxp Setup and Maintenance	
✓ Remove all Demo Data files in and under the Datafile folder.	Contact your support provider for assistance
✓ Remove all Temp files in and under the Datafile folder.	Contact your support provider for assistance
✓ Remove all History files in and under the Datafile folder.	Contact your support provider for assistance

File Attributes

Certain combinations of file attributes on the SASIxp™ server will cause incomplete file listings in some File Code columns in some SASIxp modules. These attribute combinations can also prevent files from being properly handled by some District Integration upload functions.

For example, if the Compressed, Hidden, Archive, and Indexing attributes of a file in the datafile folder are set to Off (0), the file does not display in the list of file codes in the REORG module.

Pearson Digital Learning recommends that you use the following attribute settings on all files in the SASIxp folder and all of its sub-folders:

Compressed = 0, Hidden = 0, and Indexing = 1

If you want to prevent indexing of SASIxp files, you should disable the indexing service on the server instead of removing the indexing attribute on specific files.

Details of attribute combinations are as follows:

Comp	Hidden	Archive	Index	
0	0	0	0	Not allowed
0	0	0	1	**Recommended**
0	0	1	0	Not Recommended
0	0	1	1	**Recommended**
0	1	0	0	Not allowed
0	1	0	1	Not allowed
0	1	1	0	Not Recommended
0	1	1	1	Not Recommended
1	0	0	0	Not allowed
1	0	0	1	Not allowed
1	0	1	0	Not Recommended
1	0	1	1	Not Recommended
1	1	0	0	Not allowed
1	1	0	1	Not allowed
1	1	1	0	Not Recommended
1	1	1	1	Not Recommended

ScanTools® File and Directory Permissions

(For Pre-slugging and Scanning)

ScanTools software can be installed after installing the SASIxp / NCS ABACUSxp software; however, the ScanTools software must be installed to the local workstation instead of loaded onto a file server. When ScanTools software is installed, it creates folders on the workstation's C drive. If ScanTools software is installed to another local partition, some folders are created in the target partition and some in the C partition.

When you use ScanTools software in Windows NT® environments, no special changes are required. However, if you use ScanTools software on a Windows® 2000 operating system, certain permissions must be granted to some of the ScanTools folders.

The tables below define the required permissions for the folders and the Windows Registry when ScanTools is installed on a Windows 2000 machine.

Windows 2000 Operating Systems **ScanTools Supplied with SASIxp / NCS ABACUSxp Versions Prior to 5.0**	
SASIxp	
SFW	R, E, L
SFWRT [1]	M, R, E, L, W
Apps [1]	M, R, E, L, W
Data [1]	M, R, E, L, W
Profiles [1]	M, R, E, L, W

Windows 2000 Operating Systems **ScanTools Supplied with SASIxp / NCS ABACUSxp Versions 5.0 and Later**	
SASIxp	
SFW	R, E, L
\Program Files\NCS Pearson	M, R, E, L, W
Windows Registry: HKey_Classes_Root	Read, Full Control [2]

[1] Created by the ScanTools option when setting up scanning for forms.
[2] Alternatively, make the Windows NT and Windows 2000 login user account (for the SASIxp / NCS ABACUSxp user) a member of the Windows Power Users group.

Mac OS® 9 or Mac OS X Task Server might not start or might not allow enrollment to function.

Subject:

When you install the Mac OS version of Task Server, you should confirm that the following configuration recommendations have been implemented:

1. The TaskServer folder on a Mac OS 9 machine must contain TaskServer, license.ini, sasixp.ini and CSClassicLib files. The TaskServer folder name does not have to be SASIxp.

2. The Campus atom field on the district server should have the Remote Site Data Path field prepended with an asterisk if no AppleTalk zones are defined. For example, *:192.168.100.100:sharepoint:SASIxp:Datafile: Otherwise, the zone name should begin the path statement.

3. In the SASIxp.ini file, the ApplicationInHomePath statement must be set to False.

4. The taskserver machine must have a drive mapping (mount) on the desktop to the parent folder of the school server's SASIxp folder. The name of the parent folder is not critical and is not referenced in any of the .ini files.

5. The school server and the task server must be on separate machines. Per note 4 above, the task server can only access the school server via a mapped or mounted drive.

Microsoft® Windows® XP randomly disconnects mapped drive connections.

Subject:

Task servers running on Microsoft Windows XP platforms may periodically loose mapped drive connections causing the task server upload process to fail. Application of standard auto-disconnect overrides does not resolve the problem. Configuration adjustments to virus scanners and network LANmanager parameters do not resolve the problem.

Description:

Microsoft® hotfix number 841631 for Windows XP resolves the issue. You should contact Microsoft Support and notify them of the problem. Microsoft will register the problem and provide you with the hotfix. Apply the hotfix as directed by Microsoft Support.

Solution:

Microsoft intends to provide this hotfix in Service Pack 2 (SP2) for Windows XP; but currently, SP2 for XP has not been tested or approved for the SASIxp software.

(PSS-104)

Potential loss of connectivity between a Windows XP client and a Novell NetWare server after installing Windows XP updates.

Subject:

Potential loss of connectivity between a Windows XP client and a Novell NetWare server after installing Windows XP updates.

Description:

A customer reported that after the installation of Microsoft Windows XP upgrades (upgrade version unknown), the Windows XP client could no longer communicate with the Novell server using IPX. Pearson Digital Learning has not verified this issue.

Solution:

IPX network protocol had been removed. Reinstall the IPX network protocol on the Microsoft Windows XP client system.

(PSS-68)