



ISS Technology Update

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Implementing Microsoft® Windows Server® 2008 Foundation on HP ProLiant servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01822381/c01822381.pdf
HP Insight Management Agents architecture for Windows servers, 1st edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01817285/c01817285.pdf
RAID 1(+0): breaking mirrors and rebuilding drives, 4th Edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00378986/c00378986.pdf
Visualization and Acceleration in HP ProLiant servers, 1 st edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01847918/c01847918.pdf
HP Smart Array Controller technology, 2nd edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00687518/c00687518.pdf
Using the HP Direct Connect Shared SAS storage solution with VMware ESX virtualization software	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01820849/c01820849.pdf
Technologies in HP ProLiant G6 c-Class server blades with Intel® Xeon®	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01852590/c01852590.pdf
Technologies in HP ProLiant G5 c-Class Server Blades	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01136096/c01136096.pdf
HP Virtual Connect technology for the HP BladeSystem c-Class, 3 rd edition	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00814156/c00814156.pdf

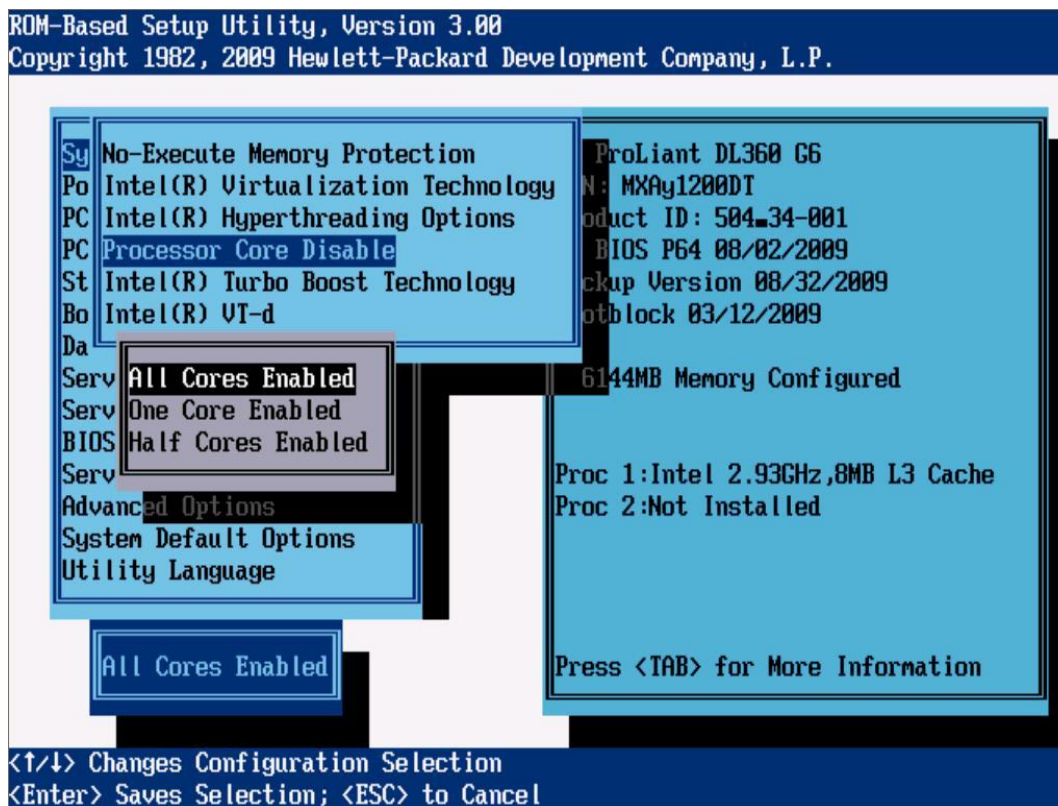
Disabling processor cores in Intel®-based HP ProLiant G6 servers

HP ProLiant G6 servers with the 4-core Intel Xeon® processor 5500 series have many new power and efficiency features. Several of these features are configurable, letting system administrators tune individual servers to provide optimal performance per watt for specific application environments. One such user-configurable feature is the option to disable individual cores within these processors. In some application environments, this feature allows administrators to configure the server to maintain comparable performance while lowering processor power consumption. In other cases, an administrator can increase overall system performance while maintaining the same processor power consumption.

Disabling processor cores using the HP ROM-based Setup Utility

The HP ROM-Based Setup Utility (RBSU) is the configuration tool used to disable processor cores in ProLiant 300 series G6 servers. Using the Core Disabling Options sub-menu located in the System Options menu of RBSU (Figure 1-1), the system administrator can configure processors with only one core enabled, half of the cores enabled, or all of the cores enabled. Once a core disabling option has been chosen and the configuration saved, it is applied to all of the processors installed in the system.

Figure 1-1. Processor Core Disable sub-menu from the RBSU on HP ProLiant 300 series G6 servers



Note

In entry level HP ProLiant servers, the RBSU interface is slightly different. The sub-menu is labeled "Active Processor Cores" rather than "Processor Core Disable."

When to disable processor cores

While disabling cores may seem counterintuitive to delivering higher performance, there are at least three situations in which disabling processor cores can prove beneficial.

Reducing power use. Disabling processor cores reduces processor power use. If a server is being used in an application environment that does not depend heavily on multi-threading, disabling cores can lower power consumption without materially affecting performance.

Increasing overall performance. Some applications benefit from higher core frequency rather than from additional processing cores. When Turbo Mode is enabled for Intel Nehalem processors, the power and heat savings realized by disabling processor cores allows the remaining cores to run at a higher frequency than their rated speed. In specific application environments, this may actually increase overall system performance.

Addressing licensing issues. Some software is licensed on a per-core basis. Disabling cores allows an administrator to match the number of active cores on a server with licensing requirements. However, some software that is licensed on a per-core basis may not recognize the disabling of cores.

There are no pre-set rules as to when disabling cores may be beneficial. Each server and application environment is unique, and many factors ultimately influence system performance. An administrator should test each specific application environment to determine whether disabling processor cores will improve performance and/or lower power consumption.

Additional resources

For additional information on the topics discussed in this article, visit:

HP ROM-Based Setup Utility User Guide	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00191707/c00191707.pdf
HP Virtual IT Center	www.hp.com/go/g6
Technology and architecture of HP ProLiant 300-series G6 servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00502616/c00502616.pdf
Technology and architecture of HP ProLiant 100-series G6 servers	http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01751718/c01751718.pdf

Understanding and implementing Accelerated iSCSI on HP ProLiant servers

This article focuses on the Internet Small Computer System Interface (iSCSI) protocol, the advantages of HP Accelerated iSCSI, and the ability to implement Accelerated iSCSI support in the embedded controllers on DL385 G5p, DL385 G6, DL360 G6, and DL380 G6 servers.

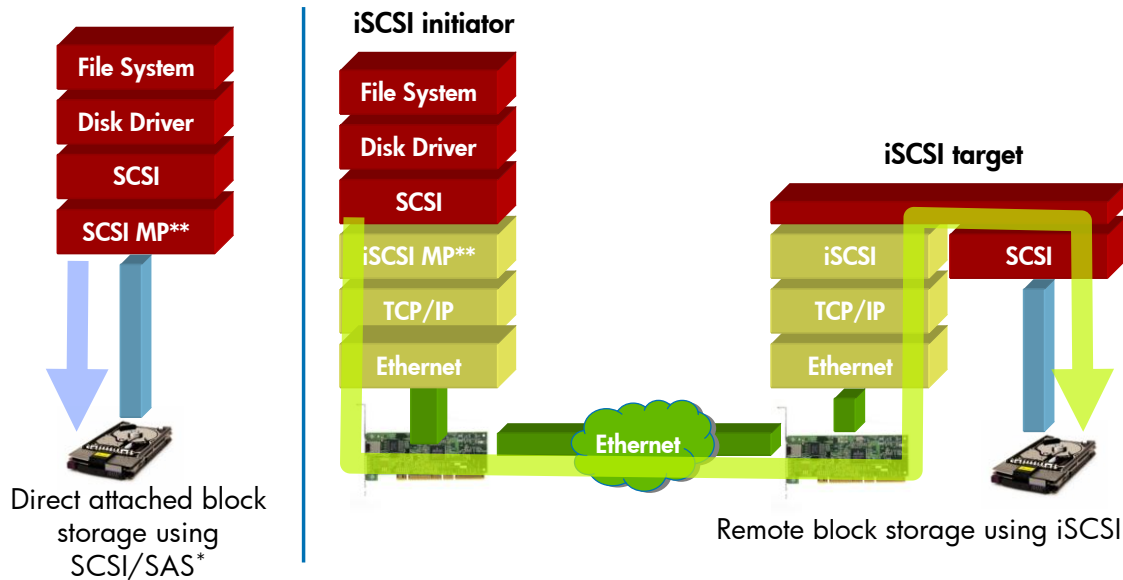
iSCSI protocol

The iSCSI standard implements the SCSI protocol over a TCP/IP network. While iSCSI can be implemented over any TCP/IP network, the most common implementation is over 1- and 10-Gigabit Ethernet (GbE). The iSCSI protocol transports block-level storage requests over TCP connections. Using the iSCSI protocol, systems can connect to remote storage and use it as a physical disk although the remote storage provider or target may actually be providing virtual physical disks.

iSCSI serves the same purpose as Fibre Channel in building SANs, but iSCSI avoids the cost, complexity, and compatibility issues associated with Fibre Channel SANs. Because iSCSI is a TCP/IP implementation, it is ideal for new field deployments where no FC SAN infrastructure exists. An iSCSI SAN is typically comprised of software or hardware initiators on the host connected to an isolated Ethernet network and some number of storage resources (targets). While the target is usually a hard drive enclosure or another computer, it can also be any other storage device that supports the iSCSI protocol, such as a tape

drive. The iSCSI stack at both ends of the path is used to encapsulate SCSI block commands into Ethernet Packets for transmission over IP networks as illustrated in Figure 2-1.

Figure 2-1. iSCSI is SCSI over TCP/IP



* Serial Attached SCSI

Initiators include both software- and hardware-based initiators incorporated on host bus adapters (HBAs) and network interface cards (NICs). Software initiators require CPU resources to manage the iSCSI protocol stack. A more efficient approach is to offload the protocol management to a hardware-based iSCSI HBA or NIC. The operating system sees an iSCSI HBA or NIC as a SCSI device.

Accelerated iSCSI

Traditional software-based iSCSI initiators generate more processing overhead for the server CPU. By contrast, HP accelerated iSCSI offloads the protocol processing to an HP Multifunction Server Adapter so that CPU utilization is reduced and iSCSI performance is accelerated. HP Accelerated iSCSI supports all targets that are certified and supported by Microsoft iSCSI Software Initiator.

ProLiant servers utilizing Accelerated iSCSI Multifunction server adapters show significant improvements in server efficiency over software-based iSCSI initiators. For more on the performance gains experienced with the Broadcom solution for HP hardware-assisted iSCSI Multifunction server adapters, read test results from the Tolly Group at <http://www.tolly.com/TS/2008/HewlettPackard/iSCSISolutions/Tolly208305HPiSCSI.pdf>.

HP Accelerated iSCSI technical advantages

There are several advantages derived from implementing Accelerated iSCSI:

- Standard configurations, including ideal input/output (I/O), read/write, random/sequential and queue sizes
- Improved I/O operations per second (IOPS) compared to iSCSI host bus adapters from other vendors
- Processing work offloaded to the NIC to free CPU cores for data-intensive workloads
- Increased server and IP storage application performance
- Increased iSCSI performance

Accelerated iSCSI application examples

Administrators can consolidate storage, enhance manageability, and enable iSCSI boot (also called ‘boot from SAN’).

HP Accelerated iSCSI Licensing Pack for 1GbE network adapters

NC373F, NC373T, and NC382T option kits have always included Accelerated iSCSI as a standard feature. As of the publication of this article, the DL385 G5p, DL385 G6, DL360 G6, and DL380 G6 ProLiant servers are shipping as “iSCSI ready,” meaning that licensing for Accelerated iSCSI is no longer required on these platforms.

An Accelerated iSCSI Pack license is still required in older ProLiant servers with NC 370i, NC371i, and NC373i embedded multifunction server adapters.

Users are required to download HP Accelerated iSCSI drivers for all compatible multifunction server adapters. Table 2-1 identifies the most current component packs for accelerated iSCSI drivers.

Table 2-1. Driver support for accelerated iSCSI

OS	Description	Current component packs
32 bit W2K3	HP NC-Series Broadcom 1Gb Multifunction Driver for Windows Server 2003	cp010384.exe v4.6.112.0
64-bit W2K3	HP NC-Series Broadcom 1Gb Multifunction Driver for Windows Server 2003 x64 Editions	cp010385.exe v4.6.112.0
32-bit W2K8	HP NC-Series Broadcom 1Gb Multifunction Driver for Windows Server 2008	cp010693.exe v4.6.112.0 B
64-bit W2K8	HP NC-Series Broadcom 1Gb Multifunction Driver for Windows Server 2008 x64 Editions	cp010694.exe v4.6.112.0 B
Linux	HP NC-Series Broadcom 1GbE & 10GbE Multifunction Drivers for Linux	netxtreme2-4.8.22-1.src.rpm
Linux	HP NC-Series iSCSI Offload Driver for Linux	bnx2i-1.6.2-1.src.rpm
Red Hat	HP NC-Series iSCSI Offload Initiator Utilities for Red Hat Enterprise Linux 5	iscsi-initiator-utils-6.2.0.868-0.18b.src.rpm
SLES	HP NC-Series iSCSI Offload Initiator Utilities for SLES10 SP1	SLES 10 SP1 - open-iscsi-2.0.707-0.25b.src.rpm
SLES	HP NC-Series iSCSI Offload Initiator Utilities for SLES10 SP2	SLES 10 SP2 - open-iscsi-2.0.707-0.44e.src.rpm

Should users want to download Softpaqs for iSCSI support, Table 2-2 identifies those Softpaqs.

Table 2-2. HP Accelerated iSCSI Softpaq

Description	Current Softpaq
HP ProLiant Networking Software	sp43831.exe

All firmware upgrades and complete Softpaqs can be downloaded from <http://www.hp.com/go/ProLiantNICs>. Select “Support and Documents” and enter the product name/number.

Additional resources

For additional information on the topics discussed in this article, visit these resources:

HP iSCSI resources	URL
HP network adapters	http://www.hp.com/go/ProLiantNICs

HP ProLiant Accelerated iSCSI for Windows User Guide	http://bizsupport.austin.hp.com/bc/docs/support/SupportManual/c00577553/c00577553.pdf
HP Insight software Accelerated iSCSI Pack for Embedded Multifunction server adapters	http://h18000.www1.hp.com/products/servers/proliantessentials/aip/index.html
Performance comparison of HP hardware and software accelerated iSCSI – Tolly Group	http://www.tolly.com/TS/2008/HewlettPackard/iSCSISolutions/Tolly208305HPiSCSI.pdf
HP iSCSI solutions brief	http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3202ENW.pdf

Performance, throughput and compatibility of HP 6-Gb/s SAS drives

HP introduced Serial Attached SCSI (SAS) hard disk drives with a 6-Gigabit-per-second (6-Gb/s) interface in the first half of 2009. In conjunction with the newly introduced drive controllers, these drives (Figure 3-1) are the next step in the evolution of the SCSI standard. As this transition begins, it is important to understand the performance, throughput, and compatibility of this new technology in relation to the existing 3-Gb/s SAS drives and controllers.

Figure 3-1. HP 6-Gb/s SAS hard disk drive



Throughput and performance for 6-Gb/s SAS drives

The new 6-Gb/s SAS interface doubles the raw communication bandwidth for each point-to-point link between individual SAS drives and the array controller. As with the previous 3-Gb/s standard, data is sent across the link using 8b/10b encoding for maximum reliability. The link has a maximum theoretical data throughput of 600 MB/s, although its practical maximum is 10% less. This compares to a maximum throughput of 300 MB/s for the older 3-Gb/s SAS interface.

In addition to the speed of the interface between the drives and the controller, overall storage subsystem performance is determined by many factors. The most current SAS drives, including those with the new 6-Gb/s interface, have a maximum sustained disk I/O of about 160 MB/s. This is the maximum rate at which data can be continuously read off of the drive, and it is significantly less than the 600-MB/s data bandwidth of a 6-Gb/s SAS interface. It is also less than the 300-MB/s bandwidth

of the existing 3-Gb/s SAS interface. Therefore, for directly attached storage configurations, there is currently no performance benefit to using 6-Gb/s SAS drives attached to 6-Gb/s-capable disk controllers.

Interoperability of 6 Gb/s drives with 3 Gb/s drives

Six-Gb/s SAS drives are completely interoperable with 3-Gb/s drives. With the SAS interface standard, each drive is connected to the array controller using a separate point-to-point link, allowing the controller to communicate with each drive independently and at its own link speed. As a result, 6-Gb/s drives do not incur any performance penalty when mixed with 3-Gb/s drives on a 6-Gb/s capable array controller. Six-Gb/s drives can be attached to 3-Gb/s controllers, but they will operate using the 3-Gb/s SAS channel.

6 Gb/s SAS drives and Modular Storage Arrays

Six-Gb/s SAS drives will provide definite performance benefits when used with next-generation HP Modular Storage Arrays (MSAs). MSAs provide external storage that is attached to the server's storage controller using a SAS wide port consisting of four SAS interface channels. MSAs then use SAS Expanders to support large numbers of drives across this connection. When the disk I/O for these drives is aggregated across the four SAS channels, the channel bandwidth becomes an important consideration. With 3-Gb/s drives and SAS channels, the four channel SAS port will typically become saturated when the MSA is configured with eight to twelve drives. The next generation of MSAs, using 6 Gb/s drives and SAS channels, will be able to support up to twice this number of drives before the SAS wide port bandwidth becomes saturated.

6 Gb/s HP Smart Array controllers

Introducing HP Smart Array controllers with 6-Gb/s SAS channels in the HP ProLiant G6 servers prepares the way for the next several generations of SAS drives. Maximum disk I/O has been increasing 30 to 40% with each disk drive generation and will soon outstrip the capabilities of the 3-Gb/s SAS channel. Disk controllers capable of supporting 6-Gb/s operation will be better able to support the increased throughput of these drives when they are introduced.

Additional resources

For additional information on the topics discussed in this article, see these resources:

Resource	URL
HP StorageWorks Modular Smart Arrays	http://h18006.www1.hp.com/storage/disk_storage/msa_diskarrays/index.html
HP ProLiant Smart Array RAID controllers	http://h18004.www1.hp.com/products/servers/proliantstorage/array/controllers/index.html

Meet the Expert—Eric Pope

Eric Pope has been a Memory Engineer for HP Industry Standard Servers (ISS) for the last six years of his ten-year career at HP. His responsibilities include memory futures, qualification, quality, and sustaining.

According to his manager, Theresa Maglitto, Eric provides technical expertise in all aspects of HP memory. She regards him as a memory technology innovator, educator, problem solver, and customer advocate. And he is a key reason why HP maintains memory technology leadership in the server industry.

A born “fixer”

Eric has always been interested in how things work. As a kid, he not only fixed things (for mom) when they broke, he sometimes took things apart before they broke. His interest in electrical engineering began when he took an electronics class in high school.

Now Eric and his wife Joni have three little fixers: Joshua (14), Timothy (12) and Taylor (10). His hobbies include, camping, fishing, hiking, music, and woodworking. In woodworking, as with memory technology, Eric likes to create a vision of what he needs and then figure out how to achieve it.

An HP memory qualification expert

Memory manufacturers constantly change their manufacturing processes as they make faster and more complex memory chips. One of Eric’s responsibilities is to qualify each memory module design and manufacturing process to minimize the occurrence of hard errors. He focuses on ways to improve memory processes, and he has developed several test tools for internal and external test teams. These tools allow engineers to test each type of memory module in the model of ProLiant server in which it will be installed. Eric also helps to re-qualify module manufacturers each time HP offers a new processor speed or a new server platform. This testing and re-qualification process results in continuous improvement of memory module reliability.

Over the past year, Eric has been working on simplifying the memory qualification process. Historically, every test case has required human intervention to kick off the test and analyze the results. Eric is working to implement a more automated approach to test memory. Aided by new circuitry in today’s servers, he is “sewing together” different software components to conduct the tests without human intervention, that is until the DIMMs need to be changed to run a new test.

Puts customers first

Theresa says that Eric has participated in many customer and sales events to help educate those who buy or sell HP memory. Eric is also a key contributor in the direct communications between the Engineering Problem Resolution team and customers. His primary goal is to make customers happy by solving their problems; therefore, he values their input. He cited some recent examples of the HP response to customer requirements: the introduction of low power memory and the introduction of 8GB and 16GB DIMMs. Eric also noted that HP was the first company to give its customers the ability to run DDR-3 memory at PC3-10600 (DDR3-1333) speeds with two DIMMs loaded per channel.



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