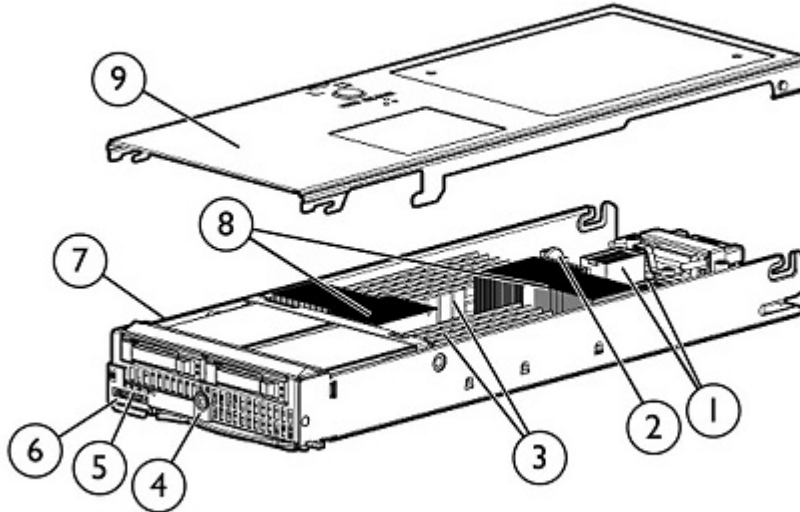


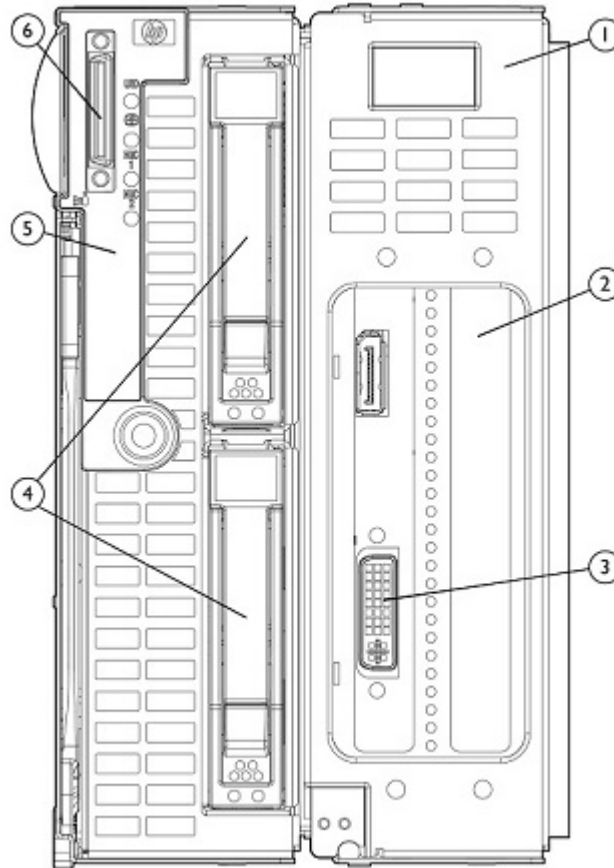
Overview



HP ProLiant WS460c G6 Workstation Blade

1. Two (2) mezzanine I/O expansion slots
2. Internal USB connector
3. Twelve (12) DDR3 Registered or Un-buffered DIMM Memory Slots
4. HP Smart Array P410i Controller
5. Two (2) small form factor (SFF) hot-plug drive bays
6. Local I/O Connector
7. Internal SD card slot
8. Up to two (2) Intel® Xeon® 5500 or 5600 series processors
9. Access Panel

Overview



HP ProLiant WS460c G6 Workstation Blade with HP WS460c G6 Graphics Expansion Blade

1. HP Graphics Expansion Blade
2. Standard full length PCI Express Generation 2 (x8) slot 2; (shown vacant)
3. Standard full-length PCI Express Generation 2 (x8); slot 1 (shown with graphics card)
4. Small form factor (SFF) drive bays
5. HP ProLiant xw460c Blade Workstation base system
6. Local I/O Connector

What's New

- Support for HP 6G SAS 15K rpm SFF (2.5-inch) Hot Plug Enterprise 3 yr Warranty Hard Drive

At A Glance

This document covers the HP ProLiant WS460c G6 workstation blade and its specific options. For more information on HP BladeSystem c-Class Enclosures and HP BladeSystem c-Class Interconnect and Mezzanine Components, please see the following:

HP BladeSystem c-Class Enclosures QuickSpecs:

HP BladeSystem c3000 Enclosure QuickSpecs:

http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html

HP BladeSystem c7000 Enclosure QuickSpecs:

http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html

HP BladeSystem c-Class Interconnect and Mezzanine Components:

<http://h18004.www1.hp.com/products/blades/components/c-class-interconnects.html>

<http://h18004.www1.hp.com/products/blades/components/c-class-adapters.html>



Overview

The HP ProLiant WS460c G6 provides greater 2P x86 server blade density without compromise and maximum power-efficiency with flexibility and choice.

HP ProLiant WS460c G6 workstation blade and optional HP WS460c G6 graphics expansion blade includes:

- **Processor:**
 - Up to two (2) Intel® Xeon® 5500 or 5600 Series processors
 - Intel® 5500 Chipset
- **Memory:**
 - Twelve (12) DIMM slots
 - Up to 192GB, using PC3-8500 DDR3 Registered (RDIMM) memory, operating at 800MHz when fully populated at 2 DIMMs per Channel in 12 slots
 - Up to 48GB, using PC3-10600 DDR3 Unbuffered (UDIMM) memory, operating at 1333MHz when fully populated at 2 DIMMs per Channel in 12 slots
- **Storage Controller:**
 - HP Smart Array P410i Controller (RAID 0/1) with optional 256MB or 512MB Battery-Backed Write Cache (BBWC)
- **Internal Drive Support:**
 - Up to two (2) small form factor (SFF) SAS hot plug hard disk drives
- **Network Controller:**
 - Embedded NC532i Dual Port Flex-10 10GbE Multifunction Server Adapter
 - One (1) additional 10/100 server adapter dedicated to iLO 2 Management
- **Mezzanine Support:**
 - Two (2) I/O expansion or graphics adapter mezzanine slots
 - Supports up to (2) mezzanine cards
 - Graphics adapter mezzanine (NVIDIA Quadro FX880M or FX2800M)
 - 4GB Dual-Port Fibre Channel Mezzanine options for SAN connectivity (Choice of Emulex or QLogic)
 - Now supporting the configuration to simultaneously run a mezzanine option card in Workstation Blade and a PCI express single slot graphics card in the Graphics Expansion Blade.
 - 4X QDR (40Gbps) and DDR (20Gbps) InfiniBand (IB) Mezzanine options for low latency and high bandwidth server interconnectivity. All QDR option support is supported on Red Hat Linux Operating System only.
- **Graphics Adapter:**
 - Professional 2D & 3D graphics with hardware acceleration via graphics subsystem
 - NVIDIA Quadro FX 880M with 1G (Single or dual cards configuration capable)
 - For professional 2D & 3D graphics with hardware acceleration via graphics subsystem
 - 1G (DDR3) memory
 - Supports up to two displays
 - Mezzanine card can occupy either mezzanine slot 1 or 2
 - NVIDIA Quadro FX 2800M (Single card configuration only)
 - For professional mid-range graphics application
 - 1G (GDDR3) memory
 - Supports up to two displays
 - Mezzanine card which occupies mezzanine slot 2
 - NVIDIA Quadro 4000 (Single wide PCIe-x16 in graphics expansion blade)
 - For professional mid-range graphics and stereoscopic 3D, scalable visualization and 3D high-definition broadcasting
 - 2GB (GDDR5) memory
 - Supports up to two displays
 - PCIe-x16 full height card (Two per Graphics Expansion Blade)
 - NVIDIA Quadro 5000 (Double Wide PCIe-x16 in graphics expansion blade)
 - For high-end 3D graphics, M&E animation and CAD applications
 - 2.5G (GDDR5) memory
 - Supports up to two displays
 - PCIe-x16 full height card (one per Graphics Expansion Blade)
 - NVIDIA Quadro 6000 (Double Wide PCIe-x16 in graphics expansion blade)
 - For ultra high-end 3D graphics, M&E animation and specialized healthcare and oil&gas applications

Overview

- 6GB (GDDR5) memory
 - Supports up to two displays
 - PCE-x16 full height card (one per Graphics Expansion Blade)
 - AMD Firestream FS9350 Compute Accelerator (Single wide PCIe-x16 in graphics expansion blade)
 - General Purpose GPU for high-performance computing and large data center, scale-out deployments
 - 2GB (GDDR5) memory
 - Supports up to two displays
 - PCE-x16 full height card (two per Graphics Expansion Blade)
 - NVIDIA Tesla M2070Q (Double wide PCIe-x16 in graphics expansion blade)
 - General Purpose GPU for high performance computing, advanced and remote visualization in a datacenter.
 - 6GB (GDDR5) memory
 - Supports up to two displays
 - PCE-x16 full height card (one per Graphics Expansion Blade)
 - Unified graphics driver for FX 880M, FX 2800M, Quadro 5000 and Quadro 6000
 - Now supporting configuration to simultaneously run a mezzanine option card in Workstation Blade and a PCI express single slot graphics card in the Graphics Expansion Blade.
 - Workstation Blade Graphics Software Environment (when combined with HP gt7725 Thin Client and HP Remote Graphics Software as access client system)
 - Quad-display capable on remote access client system
 - Displays may be oriented in landscape or portrait mode. May also be tiled in matrices
 - Resolution: Max width 7680 pixels (@7680x1200), max height 7680 pixels (@1200x7680)
- **Ports:**
 - One (1) internal USB 2.0 connector for security key devices and USB drive keys
 - One (1) internal SD-HC Card slot
- **Form Factor:**
 - HP ProLiant WS460c G6 and WS460c G6 Graphics Expansion Blade are both half-height server blades that plugs into the HP BladeSystem c3000 and c7000 enclosures
- **Infrastructure Management:**
 - Convenient slide-out Systems Insight Display for quick and easy front view server diagnostics, along with status LEDs, Automatic Server Recovery (ASR), ROM Based Setup Utility (RBSU)
 - HP Integrated Light-Out 2 (iLO 2) management processor for simplified server setup, health monitoring and recovery, power and thermal control, and lights-out remote administration
 - HP Insight Control (ICE) suites, as product options, deliver essential infrastructure management that can help save time and money by making it easy to deploy, monitor, control and optimize your IT infrastructure through a single, simple management console.

NOTE: [ICE-Linux is not supported in the HP ProLiant WS460c G6 Workstation Blade.](#)
- **Operating Systems:**
 - Supports following: (Not preinstalled or preloaded)
 - Server Operating System:
 - Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit) Standard, Enterprise and DataCenter editions
 - Client Operating Systems:
 - Genuine Microsoft® Windows 7.0® Business and Enterprise (32-bit and 64-bit)
 - Genuine Microsoft® Windows Vista® Business (32-bit and 64-bit)
 - Genuine Microsoft® Windows® XP Professional 32-bit SP3
 - Genuine Microsoft® Windows® XP Professional x64 Edition with SP2
 - RedHat Enterprise Linux version 4.8 or 5.3 (64-bit)
- **Enclosures:**
 - HP offers two different c-Class workstation blade enclosures to meet your individual needs:
 - The HP BladeSystem c7000 rack enclosure is 10U high and holds up to sixteen (16) ProLiant WS460c G6 workstations plugged vertically or (8) HP ProLiant WS460c G6 Workstation Blades paired with (8) HP WS460c G6 Graphics Expansion Blades plugged vertically.
 - The HP BladeSystem c3000 rack enclosure is 6U high and holds up to eight (8) HP ProLiant WS460c G6 workstations plugged horizontally or (4) HP ProLiant WS460c G6 Workstation Blades paired with (4) HP WS460c G6 Graphics Expansion Blades plugged horizontally.
 - Workstation blades, server blades, storage blades, interconnect modules, power supplies, fans, and redundant Onboard Administrator modules are all designed to fit into the c3000 and c7000 enclosures.

Overview

- For additional enclosure information, please see:
<http://h18004.www1.hp.com/products/ blades/ components/ enclosures/ c-class/ index.html>.
- **HP Workstation Blade Solution:**
 - The HP ProLiant WS460c G6 Workstation Blade and the HP WS460c G6 Graphics Expansion Blade are two components of the several key components for the HP Workstation Blade Solution. For additional information, please see:
<http://h20338.www2.hp.com/enterprise/cache/437050-0-0-225-121.html>
- **Warranty:**
 - This product is covered by a global limited warranty and supported by HP Services and a worldwide network of HP Authorized Channel Partners. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through HP Care Pack services or customized service agreements. Certain restrictions and exclusions apply. Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.
NOTE: Server/Workstation warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have HP replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at: <http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>

Standard Features

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

Processor

One of the following
depending on Model

Six-Core Processors

Intel® Xeon® X5675 (3.06GHz/6-core/12MB/95W, DDR3-1333, HT, Turbo 2/2/2/3/3) Processor

Intel® Xeon® E5649 (2.53GHz/6-core/12MB/80W, DDR3-1333, HT, Turbo 1/1/1/1/2/2) Processor

Intel® Xeon® E5645 (2.40GHz/6-core/12MB/80W, DDR3-1333, HT, Turbo 1/1/1/1/2/2) Processor

Quad-Core Processors

Intel® Xeon® E5630 (2.53GHz/4-core/12MB/80W, DDR3-1066, HT, Turbo 1/1/2/2) Processor

Intel® Xeon® E5620 (2.40GHz/4-core/12MB/80W, DDR3-1066, HT, Turbo 1/1/2/2) Processor

Intel® Xeon® X5570 (2.93GHz/4-core/8MB/95W, DDR3-1333, HT, Turbo 2/2/3/3) Processor

Intel® Xeon® X5560 (2.80GHz/4-core/8MB/95W, DDR3-1333, HT, Turbo 2/2/3/3) Processor

Intel® Xeon® E5520 (2.26GHz/4-core/8MB/80W, DDR3-1066, HT, Turbo 1/1/2/2) Processor

Dual-Core Processors

Intel® Xeon® E5502 (1.86GHz/2-core/4MB/80W, DDR3-800) Processor

NOTE: HT indicates that the processor model supports Intel® Hyper-Threading Technology.

NOTE: Turbo indicates the maximum potential frequency increment when using Intel® Turbo Boost Technology, with 4, 3, 2, and 1 cores active.

NOTE: DDR3 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed.

NOTE: For the Intel 5500 and 5600 Series, the letter preceding the model number indicates the performance/wattage of the processor. "X" denotes High Performance/Wattage; "E" denotes Enterprise Performance/Wattage (Mainstream); and "L" denotes Lower Wattage.

Upgradeability

Upgradeable to two (2) processors

Cache Memory

One of the following
depending on Model

4MB shared L3 cache

8MB shared L3 cache

12MB shared L3 cache

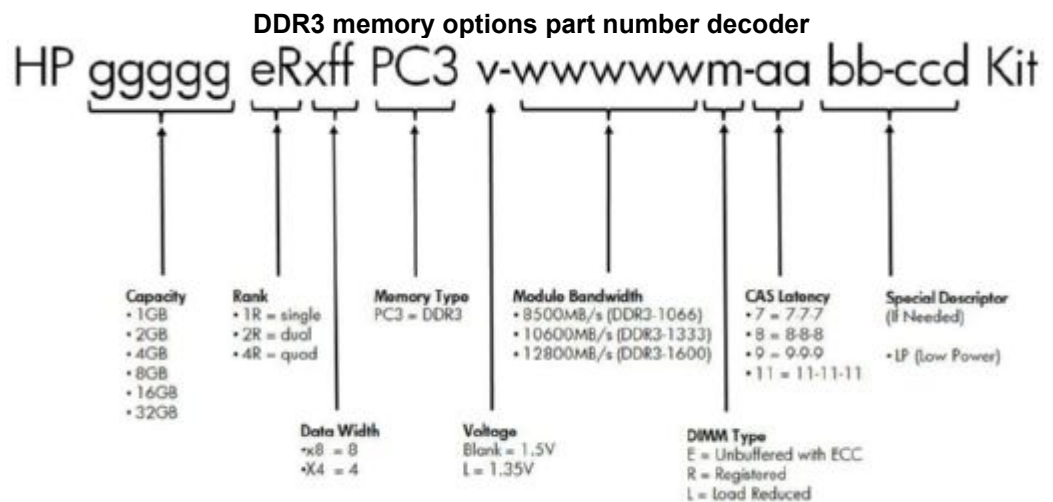
Chipset

Intel® 5500 Chipset

Standard Features

Memory	Type	DDR3 Registered (RDIMM) or Unbuffered (UDIMM)
	Standard	2GB (2 x 1GB) UDIMM
		4GB (4 x 1GB) UDIMM
	Maximum (RDIMM)	192GB (12 x 16 GB) for Registered Memory configurations
	Maximum (UDIMM)	48 GB (12 x 4 GB) for Unbuffered Memory configurations

NOTE: Depending on the memory configuration and processor model the memory speed may run at 1333MHz, 1066MHz or 800MHz. Please see the Online Memory Configuration Tool for details: www.hp.com/go/ddr3memory-configurator



Network Controller	Embedded NC532i Dual Port Flex-10 10GbE Multifunction Server Adapter One (1) additional 10/100 NIC dedicated to iLO 2 Management
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I/O Expansion Slots	Two (2) I/O expansion mezzanine slots (x8 PCI Express) Gen 2
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Graphics Adapter (mezzanine card) One of the following depending on Model	NVIDIA Quadro FX 880M graphics Generation 2 (via graphics mezzanine card) NOTE: Workstation class performance for professional 2D graphics, entry/mid 3D graphics. Supported on HP WS460c G6 only. Not compatible and supported with HP ProLiant BL server blades.										
	<table border="0"> <tr> <td>Memory size/type</td> <td>1GB / DDR3</td> </tr> <tr> <td>Cuda Cores</td> <td>48</td> </tr> <tr> <td>Number of displays</td> <td>Up to two display per FX 880M 1GB card. May be configured with two cards.</td> </tr> <tr> <td>Graphics driver</td> <td>Single, unified driver compatible with FX 880M, FX 2800M, Quadro 4000, Quadro 5000 Quadro 6000 and Tesla M2070Q.</td> </tr> </table>	Memory size/type	1GB / DDR3	Cuda Cores	48	Number of displays	Up to two display per FX 880M 1GB card. May be configured with two cards.	Graphics driver	Single, unified driver compatible with FX 880M, FX 2800M, Quadro 4000, Quadro 5000 Quadro 6000 and Tesla M2070Q.		
Memory size/type	1GB / DDR3										
Cuda Cores	48										
Number of displays	Up to two display per FX 880M 1GB card. May be configured with two cards.										
Graphics driver	Single, unified driver compatible with FX 880M, FX 2800M, Quadro 4000, Quadro 5000 Quadro 6000 and Tesla M2070Q.										
	NVIDIA Quadro FX 2800M graphics Generation 2 (via graphics mezzanine card) NOTE: Workstation class performance for professional 2D graphics, mid/mid 3D graphics. Supported on HP ProLiant WS460c G6 only. Not compatible and supported with HP ProLiant BL server blades.										
	<table border="0"> <tr> <td>Memory size/type</td> <td>1GB / DDR3</td> </tr> <tr> <td>Memory interface</td> <td>256-bit</td> </tr> <tr> <td>Cuda Cores</td> <td>96</td> </tr> <tr> <td>Number of displays</td> <td>Up to two displays per FX2800M 1GB card. May only be configured with one card.</td> </tr> <tr> <td>Graphics driver</td> <td>Single, unified driver compatible with FX 880M, FX 2800M, Quadro 4000 , Quadro 5000 Quadro 6000 and Tesla M2070Q.</td> </tr> </table>	Memory size/type	1GB / DDR3	Memory interface	256-bit	Cuda Cores	96	Number of displays	Up to two displays per FX2800M 1GB card. May only be configured with one card.	Graphics driver	Single, unified driver compatible with FX 880M, FX 2800M, Quadro 4000 , Quadro 5000 Quadro 6000 and Tesla M2070Q.
	Memory size/type	1GB / DDR3									
	Memory interface	256-bit									
	Cuda Cores	96									
Number of displays	Up to two displays per FX2800M 1GB card. May only be configured with one card.										
Graphics driver	Single, unified driver compatible with FX 880M, FX 2800M, Quadro 4000 , Quadro 5000 Quadro 6000 and Tesla M2070Q.										

Standard Features

Ultra - High End PCI Express Adapters For WS460c Graphics Expansion Blade Only

NVIDIA Quadro 4000 graphics (Single wide PCIe-x16 in graphics expansion blade)

NOTE: Workstation class performance for professional 3D graphics. Supported on HP WS460c G6 Graphics Expansion Blade only. Not compatible and supported with HP ProLiant BL server blades.

Memory size/type	2GB/ GDDR5
Memory interface	256-bit
Cuda Cores	256
Graphics driver	Single, unified driver compatible with FX 880M, FX 2800M, Quadro 4000, Quadro 5000 Quadro 6000 and Tesla M2070Q.

NVIDIA Quadro 5000 graphics (via PCI express graphics card)

NOTE: Workstation class performance for ultra high end professional 3D graphics. Supported on HP WS460c G6 Graphics Expansion Blade only. Not compatible and supported with HP ProLiant BL server blades.

Memory size/type	2.5 GB GDDR5
Memory interface	320-bit
Cuda Cores	352
Graphics driver	New driver for Quadro 5000

- Insertion of (1) PCIe graphic cards provides x16;
- Insertion of (2) PCIe graphic cards provides x8

NVIDIA Quadro 6000 graphics (via PCI express graphics card)

NOTE: Workstation class performance for ultra high end professional 3D graphics. Supported on HP WS460c G6 Graphics Expansion Blade only. Not compatible and supported with HP ProLiant BL server blades.

Memory size/type	6.0 GB GDDR5
Memory interface	384-bit
Cuda Cores	448
Graphics driver	Unified driver for Quadro 5000 and Quadro 6000

- Insertion of (1) PCIe graphic cards provides x16;
- Insertion of (2) PCIe graphic cards provides x8

NVIDIA Tesla M2070Q 6GB Module (Double wide PCIe-x16 in graphics expansion blade)

NOTE: General Purpose GPU for high performance computing, advanced and remote visualization in a datacenter. Supported on HP WS460c G6 Graphics Expansion Blade only. Not compatible and supported with HP ProLiant BL server blades.

Memory size/type	6GB GDDR5
Memory interface	384-bit
Cuda Cores	448

AMD Firestream FS9350 Compute Accelerator (Single wide PCIe-x16 in graphics expansion blade)

NOTE: General Purpose GPU for high-performance computing and large data center, scale-out deployments. Supported on HP WS460c G6 Graphics Expansion Blade only. Not compatible and supported with HP ProLiant BL server blades.

Memory size/type	2 GB GDDR5
Stream Cores	1440

Integrated Manageability

HP Integrated Lights-Out 2 (iLO 2) management processor

Standard Features

Storage Controller Type HP Smart Array P410i Controller (RAID 0/1)
 Available Options: 256MB cache, Battery-Backed Write Cache (BBWC) module for 256MB cache, 512MB cache with Battery Backed Write Cache (BBWC).
NOTE: 3Gb (6Gb Capable) SAS / 1.5Gb (3Gb Capable) SATA.
NOTE: Supports two (2) Small Form Factor (SFF) Hot Plug drive bays.
NOTE: HP Smart Array Advanced Pack not supported on WS460c G6.

Maximum Internal Storage	Hot Plug SAS	2TB	2 x 1TB Serial SCSI
	Hot Plug SATA SSD	800GB	2 x 400GB SATA SSD

Graphics Integrated ATI RN-50, 32 MB video memory (On-board)
 Resolution Color Depths 1600 x 1200, 64K, 256, 16
 1280 x 1024, 16.7M, 64k, 256, 16
 1024 x 768, 16.7M, 64k, 256, 16
 800 x 600, 16.7M, 64k, 256, 16
 640 x 480, 16.7M, 64k, 256, 16
NOTE: Maximum resolution available via HP Integrated Lights-Out 2 (iLO 2) remote console is 1280 x 1024.
NOTE: On-board graphics.

Fibre Channel Support Two (2) optional Fibre Channel HBAs are supported by the HP ProLiant WS460c G6. Both mezzanine circuit boards connect directly to the server blade system board. These Fibre Channel HBAs are available via option kits and must be ordered separately.

HBA mezzanine card option kits:

Emulex LPe1105 FC Dual Channel 4Gb, PCI-E-to-Fibre Channel Host Bus Adapter (PN 403621-B21)

- Based on the same field-proven ASIC, firmware, and driver technology as Emulex's renowned LPe1150 HBA, the Emulex LPe1105-HP is fully driver compatible with all Emulex HBAs

QLogic QMH2462 4Gb FC HBA for HP c-Class BladeSystem (PN 403619-B21)

- Uses common drivers which means that customers can standardize on one QLogic driver whether they are using the QMH2462 or other HBAs powered by QLogic

Emulex and QLogic Fibre Channel HBAs for HP BladeSystem c-Class feature:

- Optimal performance utilizing PCI Express
- 4/2/1Gb/s auto negotiating speeds (4Gb HBAs)
- Dual-ports for redundant path connections
- Optimized for HP Storage and supported by third party SAN vendors
- Support for the following operating system environments
- Genuine Microsoft® Windows 7.0® Business (32-bit and 64-bit)
- Genuine Microsoft® Windows Vista® Business (32-bit and 64-bit1)
- Genuine Microsoft® Windows® XP Professional (32-bit with SP32 and 64-bit with SP21)
- RedHat Enterprise Linux version 4.8 or 5.3 (64-bit)
- Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit)

NOTE: For Genuine Microsoft® Windows Vista® Business (32-bit and 64-bit) drivers please visit ProLiant Support Pack at:

<http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareDescription.jsp?>

Standard Features

[lang=en&cc=US&s](#)
[wltem=MTX-aa7e24c055c643529cf479863b&prodTypeId=18964&prodSeriesId=3716246](#)
NOTE: For Genuine Microsoft® Windows® XP Professional (64-bit with SP2) drivers please visit ProLiant Support Pack at:
[http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareDescription.jsp?](http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareDescription.jsp?lang=en&cc=US&s)
[lang=en&cc=US&s](#)
[wltem=MTX-aa7e24c055c643529cf479863b&prodTypeId=18964&prodSeriesId=3716246](#)
NOTE: For Genuine Microsoft® Windows® XP Professional (32-bit with SP3) drivers please visit
Emulex / Qlogic website at: <http://www.emulex.com/downloads/hp.html> and Qlogic:
[http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Product_detail_New.aspx?](http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Product_detail_New.aspx?oemid=21&companyid=4)
[oemid=](#)
[21&companyid=4](#)

Compatible SAN HP ProLiant WS460c G6 workstation blades are optimized for HP Storage MSA, EVA and XP.

HP ProLiant 460c G6 server blades are compatible with select 3rd party SANs (please see blade storage page for more details: <http://h18000.www1.hp.com/products/servers/proliant-bl/c-class/storage.html>)
NOTE: HP ProLiant WS460c G6 does not support boot from SAN.

HP Virtual Connect HP Virtual Connect in an interconnect option for BladeSystem c-Class that simplifies server connectivity to data and storage networks, and reduces costs. Unique HP Flex-10 and FlexFabric technologies make maximum use of network bandwidths, provide dynamic tuning and enable extreme flexibility to meet individual server and infrastructure requirements. HP Virtual Connect Enterprise Manager (VCEM) provides a central console to administer network connections and workloads for thousands of servers. For more information on Virtual Connect Ethernet, Fibre Channel, Converged Network and management options see: www.hp.com/go/virtualconnect

HP Insight management software HP Integrated Lights-Out 2 (iLO 2)

HP Integrated Lights-Out (iLO) simplifies server setup, health monitoring, power and thermal control, and lights-out remote administration of ProLiant ML, DL, BL servers and Workstation Blades. HP iLO functions without additional software and can be accessed from any location via a web browser. HP iLO unleashes the power of the ProLiant platform and delivers the highest possible quality of IT service to the business. For more information, visit: www.hp.com/go/iLO

HP Insight Control

HP Insight Control, a product option, delivers essential infrastructure management that can help save time and money by making it easy to deploy, migrate, monitor, remote control, and optimize your IT infrastructure through a single, simple management console.

Two versions of Insight Control are available, to serve environments requiring either a Linux-based or a Windows-based central management server: HP Insight Control for Linux*, and HP Insight Control. See www.hp.com/go/insightcontrol.

HP Insight Control includes one year of 24 x 7 HP Software Technical Support and Update Service ensuring rapid access to HP support staff and proactive delivery of software updates. For more information about this service, please visit: <http://www.hp.com/services/insight>.

* HP Insight Control for Linux not supported on the WS460c G6.

Standard Features

High Performance Clusters	HP Cluster Platforms	HP Cluster Platforms are specifically engineered, factory-integrated large-scale ProLiant clusters optimized for High Performance Computing, with a choice of servers, networks and software. Operating system options include specially priced offerings for Red Hat Enterprise Linux and Novell SLES, as well as Microsoft Windows HPC Server. A Cluster Platform Configurator simplifies ordering. http://www.hp.com/go/clusters
	HP HPC Interconnects	High Performance Computing (HPC) interconnect technologies are available for this server as part of the HP Cluster Platform portfolio. These high-speed InfiniBand and Gigabit interconnects are fully supported by HP when integrated within an HP cluster. Flexible, validated solutions can be defined with the help of configuration tools. http://www.hp.com/techservers/clusters/ucp/index.html
	HP Insight Cluster Management Utility	HP Insight Cluster Management Utility (CMU) is an HP-licensed and HP-supported suite of tools that are used for lifecycle management of hyperscale clusters of Linux ProLiant systems. CMU includes software for the centralized provisioning, management and monitoring of nodes. CMU makes the administration of clusters user friendly, efficient, and effective. http://www.hp.com/go/cmu
	HP HPC Linux Value Pack	HP HPC Linux Value Pack (Value Pack) is an HP-licensed and HP-supported option to HP Insight CMU, for the development and deployment of applications on HPC Cluster Platforms. Value Pack includes the Platform LSF workload scheduler and Platform Application Center, as well as the HP-MPI parallelization library. HP HPC Linux Value Pack

Operating Systems Support for HP ProLiant Workstations

Server Operating System:

Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit) Standard, Enterprise and DataCenter editions

Client Operating Systems:

Genuine Microsoft® Windows 7.0® Business (32-bit and 64-bit)
 Microsoft Windows Vista Business SP2 (32-bit & 64-bit)
 Microsoft Windows XP Professional SP3 (32-bit)
 Microsoft Windows XP Professional x64 edition with SP2
 Red Hat Enterprise Linux (RHEL) 4.8 and 5.3 (64-bit only)

Availability

- Dual-Port Fibre Channel Mezzanine Card options for redundant SAN connection
- Two (2) hot-plug SAS hard drive bays and integrated RAID (HP Smart Array P410i Controller)
- Optional Battery-backed write cache module for integrated RAID controller
- Redundant ROM
- Advanced ECC Memory

Industry Standard Compliance

- PCI 2.2 Compliant
- WOL Support
- SB 2.0 Support

Standard Features

Security

- Power-on password
- Administrator's password
- Integrated Lights-Out 2 has 12 customizable user accounts and SSL encryption
- Integrated Lights-Out 2 can be disabled via a Global Setting

Factory Express Portfolio for Servers and Storage

HP Factory Express offers configuration, customization, integration and deployment services for HP servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging, and custom packaging. HP products supported through Factory Express include a wide array of servers and storage: HP Integrity, HP ProLiant, HP ProLiant Server Blades, HP BladeSystem, HP 9000 servers as well as the MSAxxxx, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches.

For more information on Factory Express services on your specific server model please contact your sales representative or go to: <http://www.hp.com/go/factory-express>.

HP Enterprise Configurator

The HP e-Configure Enterprise Configurator now provides factory default racking for our HP hardware portfolio. This approach is aligned with our strategic direction to meet the needs and expectations of our valued customers. If you require "custom" rack configuration, please contact HP's Customer Business Center or an Authorized Partner for assistance. <http://www.hp.com/products/configurator>.

Service and Support

Service and Support HP Technology Services for Industry Standard Servers and BladeSystem

Capitalizing on HP ProLiant server and HP BladeSystem capabilities requires a service partner who understands your increasingly complex business technology environment. That's why it makes sense to team up with the people who know HP infrastructure hardware and software best - the experienced professionals at HP Services.

What HP ProLiant and BladeSystem Services can do for you

HP ProLiant and BladeSystem Services can help you design, deploy, test, integrate, support, and manage IT and infrastructure solutions. This way, HP proposes services solutions that include more than just uplift of base warranty. You can get the support you need by choosing from one of a number of service packaged solutions we have designed to address wider set of customer support needs:

HP Technology Services meets business challenges with services offered in three packages

Optimized Care Package, Standard Care Package, and Basic Care Package - available for each product group. Such packaged solutions enable customers to optimize technology operations, minimize risk and drive better business outcomes with easy-to-buy, easy-to-use scalable support packages for servers, storage, networking and software.

Optimized Care Package

Supports maintaining servers at optimum performance availability

HP Installation and Startup Service for HP BladeSystem c-Class Infrastructure for c3000/c7000 enclosure

Provides for the installation and startup of a BladeSystem c3000 Infrastructure in a single blade enclosure including hardware and software, including deployment of OS, HP SIM, RDP, RDP, PMP and VPM.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA0-5964ENW.pdf>

3-Year HP Critical Advantage for c3000/c7000 enclosure + 3-Year HP Critical Advantage for Blade server

Provides end-to-end infrastructure support solution for business critical applications running on virtualized/x86 infrastructures, enabling the customers to cost effectively build, operate, and continuously improve their IT environment.

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=4AA3-1772ENW>

HP Installation and Startup Service for HP BladeSystem c-Class Enhanced Network

HP Provides for the configuration and testing of BladeSystem Ethernet interconnect switches to facilitate proper implementation of network protocols and access to advanced features.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4aa0-5969ENW.pdf>

Additional Services: Virtualization Services - Strategy, Design, Transition, Operation, Continual Service Improvement.

Service and Support

Standard Care Package

Package that maintains high level of server availability

HP Installation and Startup Service for HP BladeSystem c-Class Infrastructure for c3000/c7000 enclosure

Provides for the installation and startup of a BladeSystem c3000 Infrastructure in a single blade enclosure including hardware and software, including deployment of OS, HP SIM, RDP, RDP, PMP and VPM.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA0-5964ENW.pdf>

HP Installation and Startup Service for HP BladeSystem c-Class Enhanced Network

HP Provides for the configuration and testing of BladeSystem Ethernet interconnect switches to facilitate proper implementation of network protocols and access to advanced features.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4aa0-5969ENW.pdf>

3-Year, HP 6 hour Hardware Support Onsite Call-to-Repair Service for c3000/c7000 enclosure + 3-Year, HP 6 hour Hardware Support Onsite Call-to-Repair Service for Blade server

Provides an IT manager with a team of support specialists who will quickly begin troubleshooting the system to help return the hardware to operating condition within 6 hours of the initial service request to the HP Global Solution Center.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6636ENN.pdf>

3-Year , HP 24x7 Software Support for Insight Control

Provides for the deployment and basic configuration of HP Insight Control on HP ProLiant ML and DL series servers or HP BladeSystem servers.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6645EEE.pdf>

Additional Services: Software OS (Microsoft, Linux (SUSE/Red Hat) & VMware Installation & Start Up and Software Support); Microsoft or Linux or VMware education courses; +60 Proactive Select Credits, Factory Express.

Basic Care Package

Delivers minimum recommended support service level

HP Installation and Startup Service for HP BladeSystem c-Class Infrastructure for c3000/c7000 enclosure

Provides for the installation and startup of a BladeSystem c3000 Infrastructure in a single blade enclosure including hardware and software, including deployment of OS, HP SIM, RDP, RDP, PMP and VPM.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA0-5964ENW>

3-Year, HP 24x7 4 hour Response, Hardware Support Onsite Service for c3000/c7000 enclosure + 3-Year, HP 24x7 4 hour Response, Hardware Support Onsite Service for Blade server

Provides you with rapid remote support and if required an HP authorized representative who will arrive on site any time and day of the year to begin hardware maintenance service within 4 hours of the service request being logged.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-6547EEE.pdf>

3-Year , HP 24x7 Software Support for Insight Control

Provides for the deployment and basic configuration of HP Insight Control on HP ProLiant ML and DL series servers or HP BladeSystem servers.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6645EEE.pdf>

Additional Services: Startup Blade System c-Class Enhanced Network Service; Software OS (Microsoft, Linux (SUSE/Red Hat) & VMware Installation & Start Up and Software Support); +30 Proactive Select Credits, Factory Express.

Service and Support

Insight Remote Support

The packages include HP Insight Remote Support that uses proven technology to deliver secure, reliable 24x7 remote monitoring, diagnoses, and problem resolution. It is available at no additional cost to all warranty, HP Care Pack Service, and service agreement customers.

For more information To learn more on HP ProLiant servers and HP BladeSystem servers, please contact your HP sales representative or HP Authorized Channel Partner. Or visit:
www.hp.com/services/bladesystem

Models

FX 880M graphics preconfigured model

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

NOTE: Not all models are available in all regions. Check with your local country HP offices for availability.

NOTE: Pre-configured models ship with the configurations below. Options can be selected from the Core or Additional options section of this QuickSpecs.

NOTE: HP does not allow factory integration of options into pre-configured models. Any additional options purchased will be shipped separately.

NOTE: If you desire a custom configuration please see "Configuration Information - Factory Integrated Models" section of this QuickSpecs.

HP ProLiant WS460c G6 E5630 1P 2GB-R Dual FX880M Workstation 632290-B21	Processor(s)	(1) Intel® Xeon® E5630 (2.53GHz/4-core/12MB/80W, DDR3-1066, HT, Turbo 1/1/2/2) Processor
	Cache Memory	12MB and 8MB shared L3 cache
	Memory	2GB (1 x 2 GB) PC3-10600 (DDR3-1333) Registered DIMMs (RDIMMs)
	Graphics Adapter	(2) NVIDIA Quadro FX 880M with 1GB memory
	Network Adapter	Embedded NC532i Dual Port Flex-10 10GbE Multifunction Server Adapter and one (1) additional 10/100 server adapter dedicated to iLO 2 management
	Storage Controller	Integrated HP Smart Array P410i Controller NOTE: Optional 256MB or 512MB Battery-Backed Write Cache available. Please see the Storage Controllers section listed in Additional Options section of this QuickSpecs
	Hard Drives	None ship standard NOTE: Client operating systems require local hard disk drives. Order desired capacity/performance drives separately.
	Internal Storage	SAS: 2TB (2 x 1TB SAS) - Maximum
	Optical Drive	None
	Operating System	None NOTE: Client OS license and software not included.
	Form Factor	Up to eight (8) half-height blades supported in the HP BladeSystem c3000 Enclosure Up to sixteen (16) half-height blades supported in HP BladeSystem c7000 Enclosure

Models

FX 2800M graphics preconfigured model

<p>HP ProLiant WS460c G6 E5640 1P 4GB-R Single FX2800M Workstation 632291-B21</p>	<p>Processor(s)</p>	<p>(1) Intel® Xeon® E5640 (2.66GHz/4-core/12MB//80W, DDR3-1066, HT, Turbo 1/1/2/2) Processor</p>
	<p>Cache Memory</p>	<p>12MB and 8MB shared L3 cache</p>
	<p>Memory</p>	<p>4GB (2 x 2 GB) PC3-10600 (DDR3-1333) Registered DIMMs (RDIMMs)</p>
	<p>Graphics Adapter</p>	<p>(1) NVIDIA Quadro FX 2800M with 1GB memory</p>
	<p>Network Adapter</p>	<p>Embedded NC532i Dual Port Flex-10 10GbE Multifunction Server Adapter and one (1) additional 10/100 server adapter dedicated to iLO 2 management</p>
	<p>Storage Controller</p>	<p>Integrated HP Smart Array P410i Controller NOTE: Optional 256MB or 512MB Battery-Backed Write Cache available. Please see the Storage Controllers section listed in Additional Options section of this QuickSpecs</p>
	<p>Hard Drives</p>	<p>None ship standard NOTE: Client operating systems require local hard disk drives. Order desired capacity/performance drives separately.</p>
	<p>Internal Storage</p>	<p>SAS: 2TB (2 x 1TB SAS) - Maximum</p>
	<p>Optical Drive</p>	<p>None</p>
	<p>Operating System</p>	<p>None NOTE: Client OS license and software not included.</p>
	<p>Form Factor</p>	<p>Up to eight (8) half-height blades supported in the HP BladeSystem c3000 Enclosure Up to sixteen (16) half-height blades supported in HP BladeSystem c7000 Enclosure</p>

Configuration Information - Factory Integrated Models

NOTE: This section lists some of the steps required to configure a Factory Integrated Model. To ensure only valid configurations are ordered, HP recommends the use of an HP approved configurator. Contact your local sales representative for information on CTO product offerings and requirements.

NOTE: Configure-to-order (CTO) servers must start with a CTO Chassis.

NOTE: HP does not allow factory integration of options into standard models listed above. Configure-to-order server blades must start with a CTO Blade.

NOTE: FIO indicates that this option is only available as a Factory Installable Option.

Step 1: Base Server Blade Configuration (Select a configurable Blade)

HP Models	HP ProLiant WS460c G6 Configure-to-order Blade	580139-B21
	NOTE: Single-width, half-height blade with two mezzanine card slots available.	
	HP WS460c G6 Graphics Expansion Configure-to-order Blade	594935-B21
	NOTE: Double-width half-height blade with two, full-length, PCIe x8 slots. No mezzanine card slots on base blade are currently available.	
	Configurable Model ships with:	
	Integrated NC532i Dual Port Flex-10 10GbE Multifunction Server Adapter, Integrated HP Smart Array P410i Controller (RAID 0/1) (1) additional 10/100 server adapter dedicated to iLO 2 management with Integrated Lights-Out 2 Standard Blade Edition	

Step 2: Choose Required Options (one of the following from each list unless otherwise noted)

HP Processors	NOTE: HP ProLiant WS460c G6 shares same processor modules with BL460c G6 server. If two processors are desired, select one xxxxxx-L21 and one xxxxxx-B21.	
	Six-Core Processor Option Kits	
	HP BL460c G7 Intel® Xeon® X5675 (3.06GHz/6-core/12MB/95W) FIO Processor Kit	637406-L21
	HP BL460c G7 Intel® Xeon® E5649 (2.53GHz/6-core/12MB/80W) FIO Processor Kit	637410-L21
	HP BL460c G7 Intel® Xeon® E5645 (2.40GHz/6-core/12MB/80W) FIO Processor Kit	637412-L21
	Quad-Core Processor Option Kits	
	HP BL460c G6 Intel® Xeon® E5640 (2.66GHz/4-core/12MB/80W) FIO Processor Kit	595729-L21
	HP WS460c G6 Intel® Xeon® E5630 (2.53GHz/4-core/12MB/80W) FIO Processor Kit	601459-L21
	HP WS460c G6 Intel® Xeon® E5620 (2.40GHz/4-core/12MB/80W) FIO Processor Kit	603589-L21
	HP BL460c G6 Intel® Xeon® X5570 (2.93GHz/4-core/8MB/95W) FIO Processor Option Kit	507791-L21
	HP BL460c G6 Intel® Xeon® X5560 (2.80GHz/4-core/8MB/95W) FIO Processor Option Kit	507792-L21
HP Memory	Registered DIMMS (RDIMMs)	
	HP 2GB (1x2GB) Dual Rank x8 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500656-B21
	HP 4GB (1x4GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500658-B21
	HP 4GB (1x4GB) Quad Rank x8 PC3-8500 (DDR3-1066) Registered CAS-7 Low Power Memory Kit	500660-B21

Configuration Information - Factory Integrated Models

HP 4GB (1x4GB) Single Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	593339-B21
HP 4GB (1x4GB) Single Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604504-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500662-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604506-B21
HP 16GB (1x16GB) Quad Rank x4 PC3-8500 (DDR3-1066) Registered CAS-7 Memory Kit	500666-B21
Unbuffered with ECC DIMMs (UDIMMs)	
HP 1GB (1x1GB) Single Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500668-B21
HP 2GB (1x2GB) Dual Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500670-B21
HP 4GB (1x4GB) Dual Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500672-B21

NOTE: All DDR3 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool: www.hp.com/go/ddr3memory-configurator.

NOTE: Kits described as LP include Low Power DIMMs. For more information on ProLiant Energy Efficient Features, see: www.hp.com/go/proliant-energy-efficient.

Step 3: Choose Additional Factory Integratable Options (one of the following from each list unless otherwise noted)

HP Graphics Options	NOTE: Choose from following graphics mezzanine cards for use with the single-width HP ProLiant WS460c G6 model (P/N 580139-B21).	
	NVIDIA Quadro FX880M (1G) Mezz Graphics Single Card FIO Kit	594980-B21
	HP FX880M Mezzanine Graphics Dual FIO Kit	632294-B21
	NVIDIA Quadro FX2800M (1G) Mezz Graphics Single Card FIO Kit	594936-B21
	NOTE: Single card kit can support up to two displays as dual-display configuration on the access client using HP Remote Graphics Software.	
	NOTE: Dual card kit can support up to four displays as quad-display configuration on the access client using HP Remote Graphics Software.	
	NOTE: Choose following standard PCIe graphics card for use with the double-width HP ProLiant WS460c model (P/N 594935-B21).	
	NVIDIA Quadro 4000 2GB PCI-E Adapter	655933-B21
	NVIDIA Quadro 5000 2.5GB PCI-E Adapter	655934-B21
	NVIDIA Quadro 6000 6GB PCI-E Adapter	655935-B21
	AMD Firestream FS9350 Compute Accelerator	A0K01A
	NVIDIA Tesla M2070Q 6GB GPU Graphics Module	A0C39A

Configuration Information - Factory Integrated Models

Step 4: Choose Additional Options for Factory Integration

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" section below. For additional options, including server blade enclosures interconnect and mezzanine options and power subsystem options; please see the Core Options and Additional sections below; or the following:

HP BladeSystem c3000 Enclosure QuickSpecs:

http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html

HP BladeSystem c7000 Enclosure QuickSpecs:

http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html

and HP BladeSystem c-Class Interconnect and Mezzanine Components:

<http://h18004.www1.hp.com/products/blades/components/c-class-interconnects.html>

<http://h18004.www1.hp.com/products/blades/components/c-class-adapters.html>.

Core Options

NOTE: Some options may not be integrated at the factory. To ensure only valid configurations are ordered, HP recommends the use of an HP approved configurator. Contact your local sales representative for additional information.

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" sections below.

HP Fiber Channel Mezzanine Options	Emulex LPe1105 4Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	403621-B21
	QLogic QMH2462 4Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	403619-B21

NOTE: Boot from SAN functionality not supported.

HP Processors

Six-Core Process Option Kits

HP BL460c G7 Intel® Xeon® X5675 (3.06GHz/6-core/12MB/95W) Processor Kit	637406-B21
HP BL460c G7 Intel® Xeon® E5649 (2.53GHz/6-core/12MB/80W) Processor Kit	637410-B21
HP BL460c G7 Intel® Xeon® E5645 (2.40GHz/6-core/12MB/80W) Processor Kit	637412-B21

Quad-Core Process Option Kits

HP BL460c G6 Intel® Xeon® E5640 (2.66GHz/4-core/12MB/80W) Processor Kit	595729-B21
HP WS460c G6 Intel® Xeon® E5630 (2.53GHz/4-core/12MB/80W) Processor Kit	601459-B21
HP WS460c G6 Intel® Xeon® E5620 (2.40GHz/4-core/12MB/80W) Processor Kit	603589-B21
HP BL460c G6 Intel® Xeon® X5570 (2.93GHz/4-core/8MB/95W) Processor Kit	507791-B21
HP BL460c G6 Intel® Xeon® X5560 (2.80GHz/4-core/8MB/95W) Processor Kit	507792-B21
HP BL460c G6 Intel® Xeon® E5520 (2.26GHz/4-core/8MB/80W) Processor Kit	507799-B21

Dual-Core Process Option Kits

HP BL460c G6 Intel® Xeon® E5502 (1.86GHz/2-core/4MB/80W) Processor Kit	507802-B21
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Core Options

HP Memory	Registered DIMMS (RDIMMs)	
	HP 2GB (1x2GB) Dual Rank x8 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500656-B21
	HP 4GB (1x4GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500658-B21
	HP 4GB (1x4GB) Quad Rank x8 PC3-8500 (DDR3-1066) Registered CAS-7 Low Power Memory Kit	500660-B21
	HP 4GB (1x4GB) Single Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	593339-B21
	HP 4GB (1x4GB) Single Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604504-B21
	HP 8GB (1x8GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500662-B21
	HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604506-B21
	HP 16GB (1x16GB) Quad Rank x4 PC3-8500 (DDR3-1066) Registered CAS-7 Memory Kit	500666-B21
	Unbuffered with ECC DIMMs (UDIMMs)	
	HP 1GB (1x1GB) Single Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500668-B21
	HP 2GB (1x2GB) Dual Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500670-B21
	HP 4GB (1x4GB) Dual Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500672-B21
	NOTE: All DDR3 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool: www.hp.com/go/ddr3memory-configurator .	
	NOTE: Kits described as LP include Low Power DIMMs. For more information on ProLiant Energy Efficient Features, see: http://h18004.www1.hp.com/products/servers/platforms/energyefficient/ .	

HP Hard Drives	SAS Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives	
	HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	619291-B21
	HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581286-B21
	HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581284-B21
	HP 300GB 6G SAS 15K rpm SFF (2.5-inch) Hot Plug Enterprise 3 yr Warranty Hard Drive	627117-B21
	HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507127-B21
	HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512547-B21
	HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512545-B21
	SAS Hot Plug SFF (2.5-inch) Midline (MDL) Drives	
	HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	605835-B21
	HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507610-B21

Core Options

NOTE: Please see QuickSpecs for Technical Specifications and additional information:

http://h18000.www1.hp.com/products/quickspecs/12244_div/12244_div.html
(Worldwide)

6G SAS Hot Plug Enterprise Performance Solid State Drives

HP 400GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive 632494-B21

HP 200GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive 632492-B21

6G SAS Hot Plug Enterprise Mainstream Solid State Drives

HP 800GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive 632506-B21

HP 400GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive 632504-B21

HP 200GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive 632502-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:

http://h18000.www1.hp.com/products/quickspecs/14038_div/14038_div.html
(Worldwide)

SATA Hot Plug SFF (2.5-inch) Midline (MDL) Drives

HP 1TB 3G SATA 7.2K rpm SFF (2.5-inch) Hot Plug Midline 1yr Warranty Hard Drive 625609-B21

HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive 507750-B21

NOTE: Please see QuickSpecs for Technical Specifications and additional information:

http://h18000.www1.hp.com/products/quickspecs/13021_div/13021_div.html
(Worldwide)

SATA Hot Plug 2.5" Enterprise Mainstream Solid State Drives

HP 400GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive 636597-B21

HP 200GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive 636595-B21

HP 120GB 3G SATA SFF (2.5-inch) Midline 1yr Warranty Solid State Drive 572073-B21

HP 100GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive 636593-B21

NOTE: Please see QuickSpecs for Technical Specifications and additional information:

http://h18000.www1.hp.com/products/quickspecs/13415_div/13415_div.html
(Worldwide)

NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

NOTE: The hard drive options are not required when configuring a Drive-less Model.

Additional Options

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" sections below.

NOTE: Some options may not be integrated at the factory. To ensure only valid configurations are ordered, HP recommends the use of an HP approved configurator. Contact your local sales representative for additional information.

HP Insight software	HP Integrated Lights-Out (iLO) Advanced for ProLiant BladeSystem Remote Management HP iLO Advanced for BladeSystem including 1yr 24x7 Support Single Server License 512488-B21 <p>NOTE: Electronic licenses can be used to purchase multiple licenses with a single activation key, and is available in all countries except China and Japan. Customers in China and Japan should order the physical equivalent.</p> <p>NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support Service.</p> <p>NOTE: For additional license kits please see the HP Integrated Lights-Out (iLO) QuickSpecs at: www.hp.com/go/iLO.</p>
<hr/>	
High Performance Clusters	HP Cluster Management Utility Flexible License QL803A <p>NOTE: This part number can be used to purchase one certificate for multiple licenses with a single activation key. Each license is for one node (server). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key.</p> <p>NOTE: For additional license kits please see the QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12612_div/12612_div.html (Worldwide)</p> HP Cluster Management Utility Media 433257-B21 <p>NOTE: Order a minimum of one license per cluster to purchase media including software and documentation, which will be delivered to the customer, and also licenses CMU management. No license key is delivered or required.</p> <p>NOTE: For additional license kits please see the QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12612_div/12612_div.html (Worldwide)</p> HP High Performance Computing Linux Value Pack 1 Processor Flexible License TC293B <p>NOTE: This part number can be used to purchase one certificate for multiple licenses with a single activation key. Each license is for one socket (a.k.a. processor). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key.</p> <p>NOTE: For additional license kits please see the QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/13485_div/13485_div.html (Worldwide)</p> HP High Performance Computing Linux Value Pack Media Kit TC294A <p>NOTE: This part number can be used to purchase media including software and documentation, which will be delivered to the customer.</p> <p>NOTE: For additional license kits please see the QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/13485_div/13485_div.html (Worldwide)</p>

Additional Options

HP Remote Access	HP Remote Graphics Software (RGS) v5.4.0	
	NOTE: HP RGS is licensed software sold separately. Not bundled with HP WS460c G6.	
	NOTE: For remote access to Windows Vista OS on blade, HP RGS version 5.3 or later is required.	
	NOTE: For more information on HP Remote Graphics Software, please find HP Remote Graphics in: http://www.hp.com/go/rgs	
	HP RGS Desktop E-LTU/E-Media	AW684AAE
	HP RGS Desktop E-LTU/E-Media	AW684AA
	HP RGS Desktop LTU and CD-ROM Media	AW686AA
	HP 1 year 9x5 3 Incidents Remote Graphics Software Technical Support	UE345E
<hr/>		
HP Graphic Options	NVIDIA Quadro 4000 2GB PCI-E Adapter	655933-B21
	NVIDIA Quadro 5000 2.5GB PCI-E Adapter	655934-B21
	NVIDIA Quadro 6000 6GB PCI-E Adapter	655935-B21
<hr/>		
HP Storage Controller	Optional Upgrades	
	HP 256MB P-series Cache Upgrade	462968-B21
	HP 650 mAh P-Series Battery	462969-B21
	NOTE: Requires 256 MB Cache Module.	
	HP 1GB Flash Backed Cache	534562-B21
	HP 512MB P-Series Battery Backed Write Cache Upgrade	462967-B21
	NOTE: Highly recommended for optimal performance.	
	HP 512MB Flash Backed Write Cache	534916-B21
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/13203_div/13203_div.html (Worldwide)	
<hr/>		
HP c-Class Mezzanine Options	HP 4X QDR QLogic InfiniBand Dual Port Mezzanine HCA for c-Class BladeSystem	583210-B21
	HP 4X QDR InfiniBand ConnectX-2 Dual Port Mezzanine HCA for c-Class BladeSystem	592519-B21
	NOTE: QDR InfiniBand Mezzanine cards are supported with Redhat Linux Operating System only.	
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/12586_div/12586_div.html (Worldwide)	
<hr/>		
HP Expansion Blade	HP BLc PCI Expansion Blade	448018-B21
	NOTE: Ships with one pre-installed PCI-X connect board. Also includes one PCIe connect board which requires installation.	
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/12753_div/12753_div.html (Worldwide)	
<hr/>		

Additional Options

HP USB and SD Options	HP USB 2-Button Optical Scroll Mouse	DC172B
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HP Care Pack Services **NOTE:** The HP Care Pack service part numbers below for ProLiant BL c-Class workstation blades, cover the workstation blade and all HP branded hardware options qualified for the workstation, purchased at the same time or afterwards, internal to the workstation.

Hardware Services On-site Service

HP 3 year 4 hour 13x5 WS460c Workstation Blade Hardware Support	UR334E
HP 3 year 4 hour 24x7 WS460c Workstation Blade Hardware Support	UR336E
HP 3 year 6 hour 24x7 Call to Repair WS460c Workstation Blade Hardware Support	UR338E

Memory

NOTE: Memory configurations listed do not apply to "Factory Integrated Models".

Memory Population Guidelines

For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool:

www.hp.com/go/ddr3memory-configurator

Some DIMM installation guidelines are summarized below:

- For the HP ProLiant WS460c G6 server with twelve (12) memory slots:
 - There are three (3) channels per processor; six (6) channels per server
 - There are two (2) DIMM slots for each memory channel; twelve (12) total slots.
 - Memory channel 1 consists of the two (2) DIMMs that are closest to the processor
 - Memory channel 3 consists of the two (2) DIMMs that are furthest from the processor
- DIMM slots that are white should be populated first
- Do not mix Unbuffered memory (UDIMMs) with Registered memory (RDIMMs).
- Do not install DIMMs if the corresponding processor is not installed
- If only one processor is installed in a 2CPU system, only half of the DIMM slots are available
- To maximize performance, balance the total memory capacity between all installed processors
- It is not required, but it is recommended to load the channels similarly if possible
- Populate DIMMs from heaviest load (quad-rank) to lightest load (single-rank) within a channel
- Heaviest load (DIMM with most ranks) within a channel goes furthest from the processor
- For memory mirroring mode, channel 3 must be unpopulated. Channels 1 and 2 are populated identically
- For lock-step mode, channel 3 must be unpopulated. DIMMs in channels 1 and 2 will be installed in pairs. The paired slots will be 1,4; 2,5 on the BL460c G6
- Low Voltage DIMMs can only be used with Intel Xeon 5600 series processors.
- If mixing DIMM voltage is a requirement, please note that the DIMMs will run at 1.5V since all 1.35V are capable of supporting 1.5V operations

NOTES:

- PC3-10600 DIMMs have a maximum speed of 1333MHz. PC3-8500 DIMMs have a maximum speed of 1066MHz.
- Mixing DIMM speeds is allowed, but the system processor speed rules always override the DIMM capabilities
- If you do mix DIMM speeds, the memory bus will default to the minimum clock rate of all DIMMs in the system - even if the slower DIMM is on the other processor
- If you install 1x 1066MHz DIMM in channel 1 and 1x 1333MHz DIMM in channel 2, the maximum speed will be 1066MHz
- If you install 1x 1066MHz DIMM in channel 1 and 5x 1333MHz DIMMs with 1 DIMM Per Channel (DPC) in each of the other channels, the maximum speed will be 1066MHz
- Maximum memory speed will also depend on the processor installed

HP ProLiant WS460c G6 Workstation Blade DIMM slot and configuration diagrams

Basic memory slot and population diagram

- Population order; start with "A" first, "B" second, "C" third, etc.

12 DIMM SLOTS (6 per CPU node)					
	CPU1		CPU2		
	slot #	population order	slot #	population order	
Chnl 1	1	D	1	D	Chnl 1
	2	A	2	A	
Chnl 2	3	E	3	E	Chnl 2
	4	B	4	B	
Chnl 3	5	F	5	F	Chnl 3
	6	C	6	C	

Memory

HP ProLiant WS460c G6 Server Blade (1P Model)

Standard memory configuration (1 CPU model)

- 2GB (2 x 1GB) of PC3-10600 (DDR3-1333) UDIMMs
or
4GB (4 x 1GB) of PC3-10600 (DDR3-1333) UDIMMs

	CPU1		CPU2		
	slot #	population order	slot #	population order	
Chnl 1	1	D: 1GB DIMM (if 4GB model)	1	D: empty	Chnl 1
	2	A: 1GB DIMM	2	A: empty	
Chnl 2	3	E: empty	3	E: empty	Chnl 2
	4	B: 1GB DIMM	4	B: empty	
Chnl 3	5	F: empty	5	F: empty	Chnl 3
	6	C: 1GB DIMM (if 4GB model)	6	C: empty	

Standard Memory Plus Optional Memory (1 CPU model)

- 10 GB of PC3-10600 (DDR3-1333) UDIMMs (2 x 1GB plus 4 x 2GB); (2GB memory standard model)
- 8GB of PC3-10600 (DDR3-1333) UDIMMs (4 x 1GB plus 2 x 2GB); (4GB memory standard model)

	CPU1		CPU2		
	slot #	population order	slot #	population order	
Chnl 1	1	D: 1GB DIMM (if 4GB model), 2GB DIMM (if 2GB model)	1	D: empty	Chnl 1
	2	A: 1GB DIMM	2	A: empty	
Chnl 2	3	E: 2GB DIMM	3	E: empty	Chnl 2
	4	B: 1GB DIMM	4	B: empty	
Chnl 3	5	F: 2GB DIMM	5	F: empty	Chnl 3
	6	C: 1GB DIMM (if 4GB model), 2GB DIMM (if 2GB model)	6	C: empty	

Standard Memory Replaced with Optional Memory (1 CPU model)

- 96GB of PC3-8500 Quad-Rank RDIMMs (6 x 16GB)

Memory

	CPU1		CPU2		
	slot #	population order	slot #	population order	
Chnl 1	1	D: 16GB DIMM	1	D: empty	Chnl 1
	2	A: 16GB DIMM	2	A: empty	
Chnl 2	3	E: 16GB DIMM	3	E: empty	Chnl 2
	4	B: 16GB DIMM	4	B: empty	
Chnl 3	5	F: 16GB DIMM	5	F: empty	Chnl 3
	6	C: 16GB DIMM	6	C: empty	

UDIMM maximum configuration (1 CPU model)

- 24GB, consisting of six (6) 4GB dual-rank PC3-10600 UDIMMs

	CPU1		CPU2		
	slot #	population order	slot #	population order	
Chnl 1	1	D: 4GB DIMM	1	D: empty	Chnl 1
	2	A: 4GB DIMM	2	A: empty	
Chnl 2	3	E: 4GB DIMM	3	E: empty	Chnl 2
	4	B: 4GB DIMM	4	B: empty	
Chnl 3	5	F: 4GB DIMM	5	F: empty	Chnl 3
	6	C: 4GB DIMM	6	C: empty	

Standard Memory Replaced with Optional Memory (2 CPU Model) RDIMM maximum configuration

- 192GB, consisting of twelve (12) 16GB quad-rank PC3-8500 RDIMMs

	CPU1		CPU2		
	slot #	population order	slot #	population order	
Chnl 1	1	D: 16GB DIMM	1	D: 16GB DIMM	Chnl 1
	2	A: 16GB DIMM	2	A: 16GB DIMM	
Chnl 2	3	E: 16GB DIMM	3	E: 16GB DIMM	Chnl 2
	4	B: 16GB DIMM	4	B: 16GB DIMM	
Chnl 3	5	F: 16GB DIMM	5	F: 16GB DIMM	Chnl 3
	6	C: 16GB DIMM	6	C: 16GB DIMM	

UDIMM maximum configuration (2 CPU model)

- 48GB, consisting of twelve (12) 4GB dual-rank PC3-10600 UDIMMs

Memory

	CPU1		CPU2		
	slot #	population order	slot #	population order	
Chnl 1	1	D: 4GB DIMM	1	D: 4GB DIMM	Chnl 1
	2	A: 4GB DIMM	2	A: 4GB DIMM	
Chnl 2	3	E: 4GB DIMM	3	E: 4GB DIMM	Chnl 2
	4	B: 4GB DIMM	4	B: 4GB DIMM	
Chnl 3	5	F: 4GB DIMM	5	F: 4GB DIMM	Chnl 3
	6	C: 4GB DIMM	6	C: 4GB DIMM	

NOTE: Capacity references are rounded to the common Gigabyte values.

- 1GB = 1024MB
- 2GB = 2048MB
- 4GB = 4096MB
- 8GB = 8192MB
- 16GB = 16384MB

Following are memory options available from HP:

HP Memory

Registered DIMMs (RDIMMs)

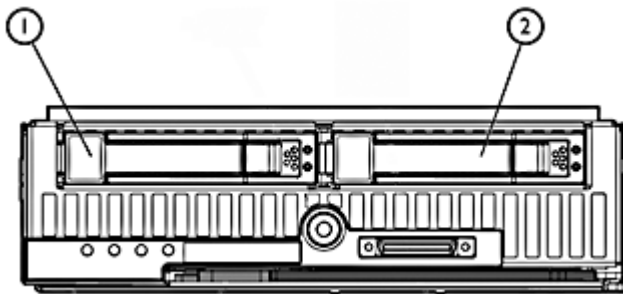
HP 2GB (1x2GB) Dual Rank x8 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500656-B21
HP 4GB (1x4GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500658-B21
HP 4GB (1x4GB) Quad Rank x8 PC3-8500 (DDR3-1066) Registered CAS-7 Low Power Memory Kit	500660-B21
HP 4GB (1x4GB) Single Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	593339-B21
HP 4GB (1x4GB) Single Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604504-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500662-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604506-B21
HP 16GB (1x16GB) Quad Rank x4 PC3-8500 (DDR3-1066) Registered CAS-7 Memory Kit	500666-B21

Unbuffered with ECC DIMMs (UDIMMs)

HP 1GB (1x1GB) Single Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500668-B21
HP 2GB (1x2GB) Dual Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500670-B21
HP 4GB (1x4GB) Dual Rank x8 PC3-10600 (DDR3-1333) Unbuffered CAS-9 Memory Kit	500672-B21

NOTE: All DDR3 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool: www.hp.com/go/ddr3memory-configurator.

Storage



1-2 2 x SFF SAS Hot Plug Hard Drives

Hard Drives

NOTE: The components of a storage subsystem (e.g. the drive, the HBA/controller, firmware, and the server backplane) should operate at the same data transfer rate or the system bandwidth will be negotiated down to an acceptable level for all components.

SAS Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives

	Quantity Supported	Position Supported	Controller
900GB 6G SAS 10K	2	1-2	HP Smart Array P410i Controller
600GB 6G SAS 10K			
450GB 6G SAS 10K			
300GB 6G SAS 15K			
300GB 6G SAS 10K			
146GB 6G SAS 15K			
72GB 6G SAS 15K			

SAS Hot Plug SFF (2.5-inch) Midline (MDL) Drives

	Quantity Supported	Position Supported	Controller
1TB 6G SAS 7.2K	2	1-2	HP Smart Array P410i Controller
500GB 6G SAS 7.2K			

6G SAS Hot Plug Enterprise Performance Solid State Drives

	Quantity Supported	Position Supported	Controller
400GB 6G SAS SLC	Up to 8	1-8	HP Smart Array P410i Controller
200GB 6G SAS SLC			

6G SAS Hot Plug Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 6G SAS MLC	Up to 8	1-8	HP Smart Array P410i Controller
400GB 6G SAS MLC			
200GB 6G SAS MLC			

SATA Hot Plug SFF (2.5-inch) Midline (MDL) Drives

	Quantity Supported	Position Supported	Controller

Storage

1TB 3G SATA 7.2K 500GB 3G SATA 7.2K 160GB 3G SATA 7.2K	Up to 8	1-8	HP Smart Array P410i Controller
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SATA Hot Plug 2.5" Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
400GB 3G SATA MLC 200GB 3G SATA MLC 120GB 3G SATA 100GB 3G SATA MLC	Up to 8	1-8	HP Smart Array P410i Controller

Technical Specifications

System Unit	Dimensions (H x W x D) 7.154 x 2.19 x 20.058 in (18.17 x 5.56 x 50.95 cm) (with bezel)									
	Weight (approximate)	<table border="0"> <tr> <td>Maximum</td> <td>14.20 lb (6.44 kg)</td> </tr> <tr> <td colspan="2">(all hard drives and processors installed)</td> </tr> <tr> <td>Minimum</td> <td>10.75 lb (4.87 kg)</td> </tr> <tr> <td colspan="2">(one hard drive and processor installed)</td> </tr> </table>	Maximum	14.20 lb (6.44 kg)	(all hard drives and processors installed)		Minimum	10.75 lb (4.87 kg)	(one hard drive and processor installed)	
Maximum	14.20 lb (6.44 kg)									
(all hard drives and processors installed)										
Minimum	10.75 lb (4.87 kg)									
(one hard drive and processor installed)										
	Power Specifications	<p>For power specifications including Input Requirements, BTU Rating, and Power Supply Output, please see the HP BladeSystem c-Class Enclosures QuickSpecs located at URL: HP BladeSystem c3000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html HP BladeSystem c7000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html</p> <p>To review typical system power ratings use the HP BladeSystem Power Sizer which is available via the online tool located at URL: http://www.hp.com/go/bladepowercalculator</p>								
	System Inlet Temperature	<table border="0"> <tr> <td>Operating</td> <td>10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1000 ft) above sea level to a maximum of 3050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed.</td> </tr> <tr> <td></td> <td>System performance may be reduced if operating with a fan fault or above 30°C (86°F).</td> </tr> <tr> <td>Non-operating</td> <td>-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).</td> </tr> </table>	Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1000 ft) above sea level to a maximum of 3050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed.		System performance may be reduced if operating with a fan fault or above 30°C (86°F).	Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).		
Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1000 ft) above sea level to a maximum of 3050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed.									
	System performance may be reduced if operating with a fan fault or above 30°C (86°F).									
Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).									
	Relative Humidity (non-condensing)	<table border="0"> <tr> <td>Operating</td> <td>10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.</td> </tr> <tr> <td>Non-operating</td> <td>5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.</td> </tr> </table>	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.	Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.				
Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.									
Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.									
	Altitude	<table border="0"> <tr> <td>Operating</td> <td>3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).</td> </tr> <tr> <td>Non-operating</td> <td>9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).</td> </tr> </table>	Operating	3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).	Non-operating	9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).				
Operating	3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).									
Non-operating	9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).									
	Acoustic Noise	<p>For acoustic noise specifications, please see the HP BladeSystem c-Class Enclosures QuickSpecs located at URL: HP BladeSystem c3000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html HP BladeSystem c7000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html</p>								

Technical Specifications

[12810_div.html](#)

HP Smart Array P410i Controller	Disk Drive Interface	3Gb (6Gb Capable) SAS (Serial Attached SCSI) 1.5Gb (3Gb Capable) SATA (Serial Advanced Technology Attachment)
	Server Interface	x4 PCI Express host interface
	Cache Memory	0 MB (none) standard Optional 256MB or 512MB Cache Memory
	Logical Drives Supported	2 (with standard 0MB cache)
	Maximum Logical Drive Capacity	32 (with optional 256MB cache) 64 (with optional 512MB cache)
	Host Memory Addressing	64-bit, supporting servers memory space greater than 4 GB
	RAID Support	RAID 1(Mirroring) RAID 0 (Striping)
	Upgradeable Firmware	Controller: Upgradeable Firmware with Recovery ROM feature Online Drive Flash (with SAS drives) requires 256MB or 512MB module

Embedded NC532i Dual Port Flex-10 10GbE Multifunction Server Adapter	Type	Integrated dual-port KR 10GbE
	Network Processor	Broadcom 57711
	Data Transfer Method	x4 PCI Express Generation 2
	Network Transfer Rate	Two ports, each at 20 Gbps full duplex; 40 Gbps aggregate full duplex theoretical bandwidth NOTE: Each port is autosensing 1 Gb / 10 Gb, and can interoperate with 1 Gb HP BladeSystem c-Class interconnect components. NOTE: Each port on the NC532i adapter transmits from the server at only 20 Gbps (theoretical) full duplex.
	IEEE Compliance	802.1p, 802.1q, 802.3u, 802.3ad, 802.3ae, 802.3ap (10GBase-KX4), 802.3x and 802.3z

GPU Capacity Planning for VDI with RemoteFX GPU Capacity Planning Each virtual machine will have an amount of the VRAM reserved from the GPU in the server. The reservation is taken from the server GPU's dedicated VRAM. The amount of VRAM reserved for a given virtual machine is based on the number of monitors and their resolutions, shown in the table below

Maximum resolution	Maximum Number of Monitors in Virtual Machine Setting			
	1 Monitor	2 Monitors	3 Monitors	4 Monitors
1024x768	75MB	10MB	135MB	165MB
1280x1024	125MB	175MB	225MB	275MB
1600x1200	184MB	257MB	330MB	
1900x1200	220MB	308MB		

Technical Specifications

NVIDIA Quadro FX 880M graphics adapter	Memory size	1 GB
	Memory type	GDDR-3
	Memory interface	128-bit
	Card type	MXM-v.3.0
	I/O interface	PCIe (x16); NOTE: HP WS460c G6 I/O slot is PCIe x8
	Max power consumption	35W (1GB)
	API	DirectX 10.1, Shader Model 4.0; OpenGL3.2
	Upgradeable Firmware	Upgradeable Firmware
	Server Operating Systems	Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit) Standard, Enterprise and DataCenter editions
	Client Operating Systems	Genuine Microsoft® Windows 7.0® Business (32-bit and 64-bit) Microsoft Windows Vista Business SP2 (32-bit & 64-bit) Microsoft Windows XP Professional SP3 (32-bit) Microsoft Windows XP Professional x64 edition with SP2 Red Hat Enterprise Linux (RHEL) 4.8 and 5.3 (64-bit only)

NVIDIA Quadro FX 2800M graphics adapter	Memory size	1 GB
	Memory type	GDDR-3
	Memory interface	256-bit
	Card type	MXM-v.3.0
	I/O interface	PCIe (x16); NOTE: HP WS460c G6 I/O slot is PCIe x8
	Max power consumption	75W
	API	DirectX 10.1, Shader Model 4.0; OpenGL3.2
	Upgradeable Firmware	Upgradeable Firmware
	Server Operating Systems	Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit) Standard, Enterprise and DataCenter editions
	Client Operating Systems	Genuine Microsoft® Windows 7.0® Business (32-bit and 64-bit) Microsoft Windows Vista Business SP2 (32-bit & 64-bit) Microsoft Windows XP Professional SP3 (32-bit) Microsoft Windows XP Professional x64 edition with SP2 Red Hat Enterprise Linux (RHEL) 4.8 and 5.3 (64-bit only)

Technical Specifications

NVIDIA Quadro FX 4000 graphics adapter	Memory size	2GB
	Memory type	GDDR-5
	Memory interface	256-bit
	I/O interface	PCIe (x16) Gen 2
	Max power consumption	142W
	API	DirectX 10.1, Shader Model 4.0; OpenGL3.3
	Server Operating Systems	Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit) Standard, Enterprise and DataCenter editions
	Client Operating Systems	Genuine Microsoft® Windows 7.0® Business (32-bit and 64-bit) Microsoft Windows Vista Business SP2 (32-bit & 64-bit) Microsoft Windows XP Professional SP3 (32-bit) Microsoft Windows XP Professional x64 edition with SP2 Red Hat Enterprise Linux (RHEL) 4.8 and 5.3 (64-bit only)

NVIDIA Quadro 5000 graphics adapter	Memory size	2.5 GB
	Memory type	GDDR-5
	Memory interface	320-bit
	I/O interface	PCIe (x16) Gen 2
	Max power consumption	152W
	API	DirectX 11, Shader Model 5.0; OpenGL4.1
	Server Operating Systems	Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit) Standard, Enterprise and DataCenter editions
	Client Operating Systems	Genuine Microsoft® Windows 7.0® Business (32-bit and 64-bit) Microsoft Windows Vista Business SP2 (32-bit & 64-bit) Microsoft Windows XP Professional SP3 (32-bit) Microsoft Windows XP Professional x64 edition with SP2 Red Hat Enterprise Linux (RHEL) 4.8 and 5.3 (64-bit only)

NVIDIA Quadro 6000 graphics adapter	Memory size	6.0 GB
	Memory type	GDDR-5
	Memory interface	384-bit
	I/O interface	PCIe (x16) Gen 2
	Max power consumption	225W
	API	DirectX 11, Shader Model 5.0; OpenGL4.1
	Server Operating Systems	Microsoft® Windows Server 2008 R2 SP1 (32-bit and 64-bit) Standard, Enterprise and DataCenter editions
	Client Operating Systems	Genuine Microsoft® Windows 7.0® Business (32-bit and 64-bit) Microsoft Windows Vista Business SP2 (32-bit & 64-bit) Microsoft Windows XP Professional SP3 (32-bit) Microsoft Windows XP Professional x64 edition with SP2 Red Hat Enterprise Linux (RHEL) 4.8 and 5.3 (64-bit only)

Technical Specifications

AMD Firestream FS9350 Compute Accelerator	Memory size	2.0 GB
	Memory type	GDDR-5
	Stream Cores	1440
	I/O interface	PCIe (x16) Gen 2
	Max power consumption	175W
	Supported Operating Systems	RHEL 5

NVIDIA Tesla M2070Q 6GB Module	Memory size	6.0 GB
	Memory type	GDDR-5
	Memory interface	384-bit
	I/O interface	PCIe (x16) Gen 2
	Max power consumption	225W
	Supported Operating Systems	RHEL 5 SLES 11 Windows Server 2008

Environment-friendly Products and Approach	End-of-life Management and Recycling	<p>Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green. To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.</p> <p>The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.</p>
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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.