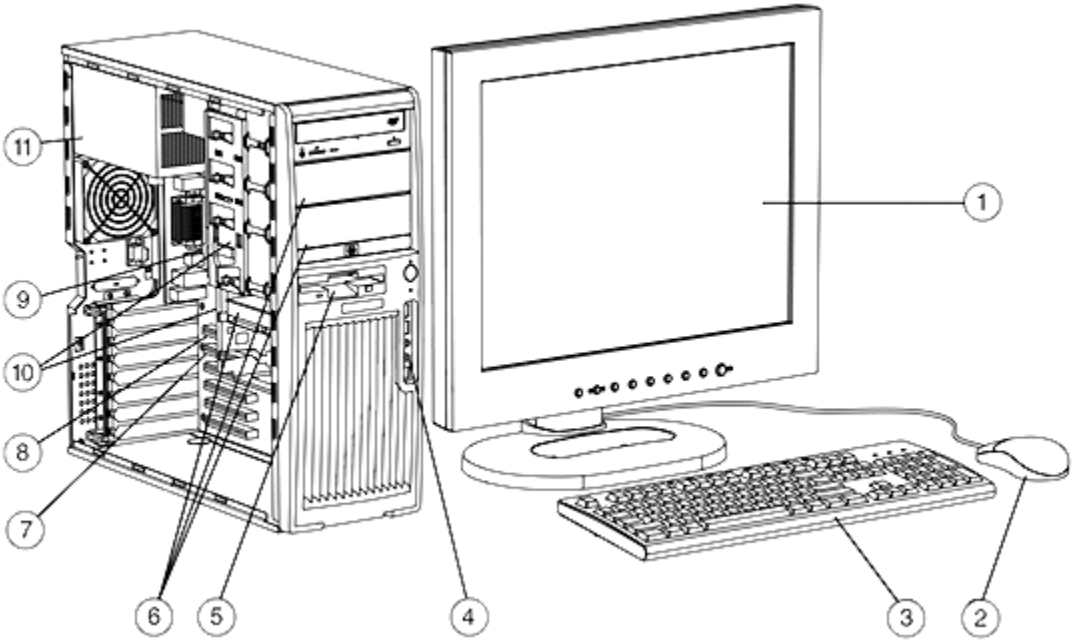
Overview

Windows® Life without Walls™.
HP recommends Windows 7.



1. Monitor (sold separately)
2. Mouse
3. Keyboard
4. Front IO: 2 USB 2.0, IEEE-1394 (requires optional PCI card to enable), headphone and microphone
5. One 3.5" external bay for optional diskette drive or other 3.5" device
6. Three 5.25" external bays (3rd external is not full depth), and two 3.5" internal bays
7. 3 PCI slots, 1 PCI Express x1 slot, 1 PCI Express x8 slot (with x4 functionality), 2 PCI Express x16 slots (one exclusive for graphics)
8. Rear IO: 7 USB 2.0, 1 standard serial port, 1 optional serial port, 1 parallel port, PS/2 keyboard, PS/2 mouse, RJ-45, External SATA, audio line in, audio line out, and microphone in.
9. 3 USB 2.0 internal port (1 type A receptacle, 2 headers)
10. R475 watt (continuous) 80 PLUS efficient power supply.
11. Intel®Core™2 Duo, Core 2 Quad, Core 2 Extreme processor or Intel Pentium®Dual Core processor; all processors are EM64T capable

Form Factor	Convertible Minitower
Compatible Operating Systems	Genuine Windows®7 Professional 32-Bit Genuine Windows®7 Professional 64-Bit Genuine Windows®7 Professional 32-bit Downgrade to Genuine Microsoft®Windows®XP Professional 32-bit Genuine Windows®7 Professional 64-bit Downgrade to Genuine Microsoft®Windows®XP Professional 64-bit * Systems may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details. Genuine Windows Vista®Business 32-bit Genuine Windows Vista®Business 64-bit Genuine Windows Vista 32-bit downgrade to Genuine Microsoft®Windows XP®Professional 32-bit Genuine Windows Vista 64-bit downgrade to Genuine Microsoft Windows XP Professional 64-bit Genuine Windows Vista®Home Basic 32-bit

Overview

	HP Linux Installer Kit for Linux (includes drivers for both 32-bit & 64-bit OS versions of Red Hat Enterprise Linux WS4 and WS5 - see: http://www.hp.com/workstations/software/linux) For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix. Novell SLED 11 Linux
Available Processors	Intel Core™2 Quad processors with Intel 64 architecture: • Quad-Core • 1333 MHz Front Side Bus • 4, 6, or 12 MB L2 cache • Virtualization Technology available with most processor options Intel Core™2 Duo processors with Intel 64 architecture: • Dual-Core • 1066/1333 MHz Front Side Bus • 3, 4, or 6 MB L2 cache • Virtualization Technology Intel Pentium™Dual-Core processors with Intel 64 architecture: • Dual-Core • 800 MHz Front Side Bus • 1 or 2 MB L2 cache
Available Processor Disclaimers	Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details. Intel®64 Architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel 64 Architecture. Processor will not operate (including 32-bit operation) without an Intel 64 Architecture -enabled BIOS. Performance will vary depending on your hardware and software configurations. See: http://www.intel.com/technology/64bitextensions for more information. Quad-Core and Dual-Core are new technologies designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; not all customers or software applications will necessarily benefit from use of these technologies.
Chipset	Intel X38 Express chipset
Color	Carbonite/Alloy metallic
Convertibility	Yes. 5.25" drives rotate for Minitower or Desktop orientation
Expansion Slots (see system board section for more details)	• 3 PCI slots (full-height, full-length) • 1 PCI Express x8 slot (x4 functionality) • 1 PCI Express x1 slot (half length) • 2 PCI Express x16 Gen2 slots (one dedicated for graphics)
Expansion Bays (see storage section for more details)	• 2 internal 3.5" bays • 1 external 3.5" bay, 3 external 5.25" bays* * Third external 5.25" bay is not full depth in side orientation.
Front I/O	2 USB 2.0, 1 IEEE 1394 (requires optional PCI card to function), 1 audio out, and 1 microphone. **NOTE:** Although HP Personal Workstations can be ordered with the HP Installer Kit for Linux and an IEEE 1394 card, HP cannot provide customer support for this configuration. Please refer to the Linux Hardware Support Matrix (http://www.hp.com/support/linux_hardware_matrix) for details, and to the Linux User Manual (http://www.hp.com/support/linux_user_manual) for tips on user-enablement of the IEEE 1394 Card.
Internal I/O	1 USB 2.0 Type A Receptacle, 2 USB 2.0 headers

Overview

Rear I/O	7 USB 2.0, 1 serial, 1 optional serial port, parallel port, 2 PS/2, RJ-45 (NIC), 1 External SATA, 1 audio line in, 1 audio line out, 1 microphone in; audio ports can be retasked to function as line in, line out, microphone, or headphone.	
Interfaces Supported	1 SATA 3 Gb/s interface (5 internal, 1 external SATA connectors)	
On-board RAID Support	SATA (Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: http://www.hp.com/support/linux_hardware_matrix for details.)	
Chassis Dimensions (W x D x H)	Standard minitower orientation: 16.8 x 45.6 x 45.0 cm; 6.6 x 17.9 x 17.7 inches Converted desktop orientation: 45.0 x 45.6 x 16.8 cm; 17.7 x 17.9 x 6.6 inches	
Weight	Exact weights depend upon configuration Minimum: 13.6 kg (29.9 lbs) Standard: 15.1 kg (33.3 lbs) Maximum: 19.6 kg (43.3 lbs)	
Temperature	Operating:	5° to 35°C (40° to 95°F)
	Non-operating:	-40° to 60°C (-40° to 140°F)
Humidity	Operating:	8% to 85%
	Non-operating:	8% to 90%
Maximum Altitude (non-pressurized)	Operating:	3,000 m; 10,000 feet
	Non-operating:	9,100 m; 30,000 feet
Power Supply	475 watts wide-ranging, active Power Factor Correction, 85% Efficient	
NIC	Integrated HP Gbit LAN by Broadcom	
Manageability	Preloaded Manageability Tools (Microsoft Windows®only)	

Supported Components

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel Core™2 Duo/Quad-Core Processor with Intel®64 Architecture				
Intel Core 2 Quad Q9650 Processor / 3.00 GHz, 12 MB L2 cache, 1333 MHz FSB	Y	N		
Intel Core 2 Quad Q9550 Processor / 2.83 GHz, 12 MB L2 cache, 1333 MHz FSB	Y	N		
Intel Core 2 Quad Q9505 Processor / 2.83 GHz, 6 MB L2 cache, 1333 MHz FSB	Y	Y		
Intel Core 2 Quad Q9400 Processor / 2.66 GHz, 6 MB L2 cache, 1333 MHz FSB	Y	Y		
Intel Core 2 Quad Q8400 Processor / 2.66 GHz, 4 MB L2 cache, 1333 MHz FSB	Y	Y		
Intel Core 2 Duo E8600 Processor / 3.33 GHz, 6 MB L2 (shared), 1333 MHz FSB	Y	N		
Intel Core 2 Duo E8500 Processor / 3.16 GHz, 6 MB L2 (shared), 1333 MHz FSB	Y	N		
Intel Core 2 Duo E8400 Processor / 3.00 GHz, 6 MB L2 (shared), 1333 MHz FSB	Y	N		
Intel Core 2 Duo E7600 Processor / 3.06 GHz, 3 MB L2 cache,1066 MHz FSB	Y	Y		
Intel Core 2 Duo E7500 Processor / 2.93 GHz, 3 MB L2 cache,1066 MHz FSB	Y	N		
Intel Pentium Dual-Core Processor with Intel®64 Architecture				
Intel Pentium Dual-Core E5200 Processor / 2.50 GHz, 2 MB L2 cache, 800 MHz FSB	Y	N		

Most Intel Core 2 Duo and Core 2 Quad processors support Intel Virtualization Technology. Intel Virtualization Technology requires a computer system with a processor, chipset, BIOS, virtual machine monitor (VMM), and applications enabled for virtualization technology. Functionality, performance, or other virtualization technology benefits will vary depending on hardware and software configurations.

Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: http://www.intel.com/products/processor_number/ for details. Intel®64 Architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel®64 Architecture. Processor will not operate (including 32-bit operation) without an Intel®64 Architecture-enabled BIOS.

Performance will vary depending on your hardware and software configurations. See: http://www.intel.com/technology/64bitextensions for more information, including details on which processors support Intel®64 Architecture, or consult with your system vendor for more information.

Supported Components

SAS Hard Drives
Up to 4 of the following SATA drives, or 4 of the following SAS drives (conditions apply)

SATA Hard Drives

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations				
146 GB 15K rpm SAS 3.0 Gb/s 3.5" Hard Drive	Y	Y	EA330AA	
300 GB 15K rpm SAS 3.0 Gb/s 3.5" Hard Drive	Y	Y	EM174AA	
450 GB 15K rpm SAS 3.0 Gb/s 3.5" Hard Drive	Y	Y	FM803AA	
SATA (Serial ATA) Hard Drives for HP Workstations				
80 GB 10K rpm SATA with NCQ Hard Drive	Y	Y	EM172AA	
160 GB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	PV944A	
160 GB 10K rpm SATA with NCQ 2.5" Hard Drive	Y	Y	EW222AA	
250 GB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	EA788A	
500 GB 7,200 rpm SATA 3.0 Gb/s with NCQ 3.5" Hard Drive	Y	Y	PV943A	
1000GB (1TB) SATA 7200 rpm 3.0Gb/s 3.5" HDD	Y	Y	GE262AA	

Hard Drive Controllers

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Factory integrated RAID on motherboard for SATA drives				
RAID 0 Configuration - Striped Array	Y	Y		
RAID 0 Data Configuration -- Boot/OS Drive + 2 Drive Striped Array	Y	Y		
RAID 1 Configuration - Mirrored Array	Y	Y		
Integrated SATA 3.0 Gb/s Controller				
Integrated SATA 3.0 Gb/s Controller, RAID 0, 1, 10, 5 supported	Y	Y		See NOTE 2
LSI 3041E 4-Port SAS 3.0 Gb/s RAID Card				
LSI 3041E 4-Port SAS 3.0 Gb/s RAID Card	Y	Y	EH417AA	See NOTE 2 and 3
LSI MegaRAID®SAS 8888ELP Host Bus Adapter (HBA)				
LSI 8888ELP 8-port SAS HW RAID Card	Y	Y	GE258AA	

All drives must be identical in type and capacity

All RAID arrays must be less than 2 TB

NOTE 1: Requires identical hard drives (speeds, capacity, interface. Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: http://www.hp.com/support/linux_hardware_matrix for details.
NOTE 2: Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: http://www.hp.com/support/linux_hardware_matrix for details.
NOTE 3: Not supported when HD drive 1 is SATA

Supported Components

PCI Express Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported Multi Mixed
Professional 2D					
NVIDIA Quadro NVS 290 256 MB PCIe Graphics Card with 'DMS-59 to Dual DVI cable' included - for Workstations	Y	Y	GN502AA	1 or 2 of these cards are supported - 2nd card must be NVS 290 or NVS 440	1
HP 'DMS-59 to Dual VGA' Cable Kit	Y	Y	GS567AA		1
NVIDIA Quadro NVS 295 256MB PCIe Graphics Card	Y	Y	FY943AA		1
NVIDIA Quadro NVS 450 512 MB PCIe Graphics Card	Y	Y	FH519AA	Single NVS 450 or NVS 290 + NVS 440 supported; Includes (2) DMS-59 to Dual VGA cables and (2) DMS-59 to Dual DVI cables	1
Entry 3D					
ATI FirePro V3700 256MB PCIe Graphics Card	Y	Y	FY944AA		1
NVIDIA Quadro FX 380 256MB PCIeGraphics Card	Y	Y	NB769AA		1
NVIDIA Quadro FX 580 512MB PCIe Graphics Card	Y	Y	FY945AA		1
Mid-range 3D					
ATI FirePro V5700 512MB PCIe Graphics Card	Y	Y	FY947AA		1
NVIDIA Quadro FX 1800 768MB PCIe Graphics Card	Y	Y	FY946AA		1
High-end 3D					
ATI FirePro V7750 1.0GB PCIe Graphics Card	Y	Y	FY948AA		1
NVIDIA Quadro FX 3800 1.0GB PCIe Graphics Card	Y	Y	FY949AA		1
NVIDIA Quadro FX 4800 1.5GB PCIe Graphics Card	Y	Y	FQ138AA	See NOTE 1	1
Elemental Accelerator Software for NVIDIA Quadro	Y	Y	VH158AA		1

NOTE 1: This card consumes 2 PCIe slots, reducing the maximum number of PCI cards in a system

Supported Components

Memory	Configure To Order (CTO) (One of the following)	Option Kit Part Number	Support Notes
	PC2-6400 ECC Unbuffered DDR2-800 RAM		
	HP 1GB (1x1GB) DDR2-800 non-ECC RAM		
	HP 1GB (1x1GB) DDR2-800 ECC RAM		
	HP 2GB (2x1GB) DDR2-800 non-ECC RAM		
	HP 2GB (2x1GB) DDR2-800 ECC RAM		
	HP 4GB (2x2GB) DDR2-800 ECC RAM		
	HP 4GB (4x1GB) DDR2-800 ECC RAM		
	HP 8GB (4x2GB) DDR2-800 ECC RAM		
	HP 8GB (2x4GB) DDR2-800 ECC RAM		
	HP 12GB (2x2GB, 2x4GB) DDR2-800 ECC RAM		
	HP 16GB (4x4GB) DDR2-800 ECC RAM		
	NOTE: Only unbuffered DDR2 DIMMs are supported. All DIMMs must be either x8 or x16 width.		
	After Market Options (AMO) (Configurations less than 1 GB are not supported on Microsoft Vista 64 or Vista 64 downgrade to XP 64. Please install memory in pairs. Configurations using three DIMMs are not supported by HP.)		
	PC2-6400 ECC Unbuffered DDR2-800 RAM		
	1 GB PC2-6400E DDR2-800 ECC	GH739AA	
	2 GB PC2-6400E DDR2-800 ECC	GH740AA	
	4 GB PC2-6400E DDR2-800 ECC	VH933AA	
	NOTE: Only unbuffered DDR2 DIMMs are supported. All DIMMs must be either x8 or x16 width. Memory must be installed in pairs.		

Multimedia and Audio Devices	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Thin USB Powered Speakers	Y	Y	RD628AA	
Integrated High Definition audio with internal speaker	Y	Y		
Sound Blaster X-Fi XtremeGamer Audio Card (PCI)	Y	Y	GE257A	

Optical and Removable Storage	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP DVD+/-RW Drive	Y	Y		See NOTE 1
HP DVD-ROM Drive	Y	Y	EW268AA	See NOTE 2
1.44 MB Diskette Drive (1 only)	Y	Y	DY670A	
HP 16-In-1 Media Card Reader with PCI Card	Y	Y	EM718AA	

NOTE 1: LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.
NOTE 2: Not supported as a 2nd drive option.

Supported Components

Controller Cards

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Firewire/IEEE 1394a PCI Card	Y	Y	PA997A	

Monitors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP LP2275w 22-inch Widescreen LCD Monitor	Y	Y		
HP LP2465 24-inch Widescreen LCD Monitor	Y	Y		
HP LP3065 30-inch Widescreen LCD Monitor	Y	Y		

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Broadcom 5755 NetXtreme Gigabit Ethernet PCIe NIC	Y	Y		
Broadcom 5751 NetXtreme Gigabit Ethernet PCIe NIC	Y	Y	EA833AA	

"Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.
NOTE 1: Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer.
To download the tool, visit: http://www.windowsvista.com/upgradeadvisor.
For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP USB Standard Keyboard	Y	Y	DT528A	
HP PS/2 Standard Keyboard	Y	Y	DT527A	
HP USB Laser Mouse	Y	Y	GW405AA	
HP PS/2 Optical Scroll Mouse	Y	Y	EY703AA	
HP USB 2-Button Optical Scroll Mouse	Y	Y	DC172B	
HP USB Optical 3-Button Mouse	Y	Y	DY651AA	
HP USB Smart Card Keyboard	N	Y		
HP 2.4GHz Wireless Keyboard & Mouse	N	Y	NB896AA	
HP SpaceExplorer 3D USB Controller	N	Y	RY429AA	
HP SpacePilot 3D USB Intelligent Controller	N	Y	EF390AA	

Supported Components

Racking and Physical Security

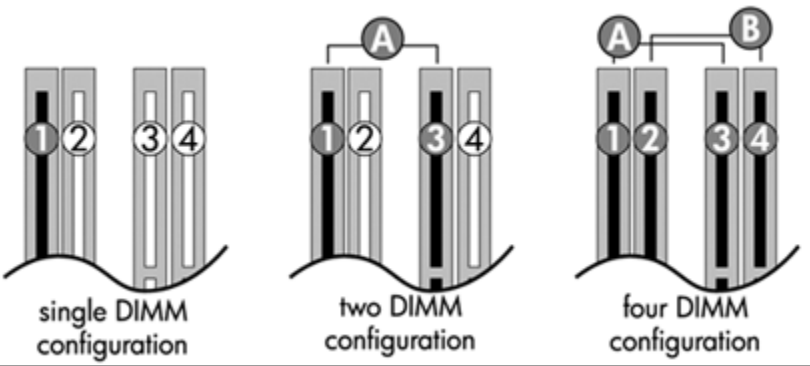
	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP (CMT) Solenoid Lock	Y	Y	DE618A	
Security Cable with Kensington Lock	Y	Y	PC766A	
HP 2006 Business PC Security Lock Kit	Y	Y	PV606AA	
HP xw4/Z4 Depth Adjustable Fixed Rail Rack Kit	Y	Y	EK729AA	

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Configure minitower in desktop orientation	Y	Y		
HP Power Cord Kit	Y	Y	DM293A	Needs specific localization
HP Serial Port Adapter	Y	Y	PA716A	One standard, one optional
HP Internal USB Port Kit	N	Y	EM165AA	Up to two internal USB port kits can be used to provide two internal USB ports
HP Optical Bay HDD Mounting Bracket	Y	Y	DY659A	
Modem RJ11 Adapter Kit	Y	Y	DC131C	

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Alert Standard Format specification	Y	Y		
HP Performance Tuning Framework	Y	Y		
HP Backup and Recovery	Y	Y		
PDF Complete	Y	Y		
Microsoft Office 2007 Small Business Edition	Y	Y		
HP ProtectTools Security	Y	Y		
HP RGS PC 3-year Software Assurance	Y	Y		
HP RGS V5 PC Edition	Y	Y		
HP RGS V5 Workstation Edition	Y	Y		
HP RGS Workstation 3-year Software Assurance	Y	Y		
HP RGS V5 Receiver Site License	Y	Y		

System Board	
System Board Form Factor	ATX 243.84 x 304.8 mm (9.6 x 12 inches)
Processor Socket	Single LGA775
CPU Bus Speed	800, 1066, and 1333 MHz FSB
Chipset	Intel X38 Express North Bridge/ICH9R South Bridge
Super I/O Controller	SMSC SCH5327
Memory Expansion Slots	4 DDR2 memory slots
Memory Type Supported	1.8V DDR2 (ECC memory modules)
Memory Modes	Dual channel
Memory Speed Supported	DDR2 SDRAM PC2-5300E (667 MHz) unbuffered ECC or DDR2 SDRAM PC2-6400E (800 MHz) unbuffered ECC
Memory Protection	ECC available on data, parity on address and command
ECC/Chipkill Parameters	
Maximum Memory	Supports up to 16 GB DDR2-667 or DDR2-800 ECC unbuffered memory **NOTE:** Maximum memory capacities assume 64-bit operating systems, such as genuine Windows®Vista Business 64, XP Professional x64 Edition, Red Hat Linux 64-bit. Genuine Windows Vista Business 32 and XP Professional (32-bit) support up to 4 GB. 32-bit Linux supports up to 8 GB.
	
Memory Configuration (Supported)	PC2-5300E DDR2-667 ECC Unbuffered or PC2-6400E DDR2-800 ECC Unbuffered RAM DIMMs Only Error Checking and Correcting unbuffered DDR2 DIMMs are supported and must be either x8 or x16 width. Memory upgrades are accomplished by adding DIMMs of the same or varied sizes. The Intel chipset supports both PC2-5300 DDR2-667 and the PC2-6400E DDR2-800 ECC unbuffered memory. It is suggested to not mix ECC and non-ECC memory. For best performance the total amount and type of memory loaded into Channel A and Channel B should be the same. If it is not, your computer will see all the RAM installed but will run the memory controller at a lower performance mode. Although not required, for best performance add the memory in pairs rather than as a single DIMM (two 1 GB DIMMs will have better performance than a single 2 GB DIMM). Also, add the memory into both channels (e.g., one in socket 1 and one in socket 3) to take advantage of dual channel performance. If you have unused slots within a channel, make them socket 2 and socket 4. This provides the best margin for the memory bus. If you are only using 1 DIMM, install it in socket 1. **POSSIBLE MEMORY CONFIGURATIONS** Not all memory configurations possible are represented below. Please install memory in pairs. Configurations using three DIMMs are not supported by HP.

System Technical Specifications

DIMM Size		**Slot 1**	**Slot 2**	**Slot 3**	**Slot 4**
	512 MB (single channel performance configuration)	512 MB			
	1 GB	512 MB		512 MB	
	1 GB				
	2 GB	1 GB		1 GB	
	2 GB	512 MB	512 MB	512 MB	512 MB
	4 GB	1 GB	1 GB	1 GB	1 GB
	4 GB	2 GB		2 GB	
	4 GB				
	6 GB	1 GB	2 GB	1 GB	2 GB
	8 GB	2 GB	2 GB	2 GB	2 GB
	8 GB	4 GB		4 GB	
	16 GB	4 GB	4 GB	4 GB	4 GB
	32 GB				
PCI Express Connectors (Gen2 Rev 0.7 connectors)	2 PCI Express x16 Gen2 Rev 0.7 (75W+75W) 1 PCI Express x8' (x4 electrical) 1 PCI Express x1				
PCI Connectors (5.0V)	2 full length, 1 half-length 33 MHz 32-Bit				
Interfaces Supported	**SATA**	1 SATA 3.0 Gb/s interface (5 SATA connectors) gen2			
Serial Attached SCSI	Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit: http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.)				
Integrated RAID	• RAID 0, 1, 5*, or 10* on a single array, up to 4 hard drives depending on the RAID level supported (RAID 0 and 1 available factory integrated) • Support for 1 or 2 RAID arrays on 4-ports for RAID 0 or 1 • RAID 1 spare and auto-rebuild • Matrix RAID support • AHCI support for NCQ drives • 3.0 Gb/s drive support NOTE: Specific user-configured hardware SAS RAID configurations are supported on this Linux system. Please visit: http://www.hp.com/support/linux_hardware_matrix for details.				
Network Controller	Integrated Broadcom 5755 Gigabit Ethernet LOM				
External SATA (eSATA)	1 dedicated rear eSATA, 1.5 Gbps				
IDE connector	No				
Floppy connector	Yes				
LAN (RJ45)	Yes				
Serial	Yes				
2nd Serial	Yes (requires optional 2nd Serial Port Adapter)				
Parallel	Yes				
Audio	Integrated high definition digital audio with Line in, Line Out, Microphone, Headphone				
CD-ROM input/Audio	No				
AUX INPUT; Audio	Yes				

System Technical Specifications

USB Connector(s)	**Front**	2
	Rear	7
	Internal	3 (one Female Type A and one dual channel 2x5 pin header)
Flash ROM	Yes	
Clear Fan Header	Yes	
CPU Fan Header	Yes	
Chasiss Fan Header	Yes	
Front PCI Fan Header	Yes	
Front Control Panel/Speaker Header	Yes	
CMOS Battery Holder - Lithium	Yes	
Integrated Trusted Platform Module	TPM 1.2 integrated in Broadcom LOM	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Clear Password Jumper	Yes	
Power Supply	475 watt custom power supply	
Operating Voltage Range	90 - 269 VAC	
Rated Voltage Range	100 - 240 VAC 118 VAC	
Rated Line Frequency	50/60 Hz 400Hz	
Operating Line Frequency Range	47 - 66 Hz 393-407 Hz	
Rated Input Current	10 A @ 100-127 VAC; 6A @ 200-240 VAC 10 A @ 118 VAC	
Heat Dissipation	Typical 1419 btu/hr (358 kg-cal/hr) Maximum 2027 btu/hr (511 kg-cal/hr)	
Power Supply Fan	92x25 mm variable speed	
ENERGY STAR® qualified (Config Dependent)	Yes	
80 PLUS Compliant	Yes	
FEMP Standby Power Compliant 115V (Wake-on LAN disabled) (<2W in S5 - Power Off)	Yes	
Power consumption in sleep mode (as defined by ENERGY STAR) - Suspend to RAM (S3)	<5W	
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Withstands power surges up to 2000V	

System Technical Specifications

Blue Angel Compliant (<5w in S5 - Power Off)	N/A	
Hood Lock Header	Yes	
Hood Sensor Header	Yes	
ASF 2.0 (Alert Standard Format)	Yes	
System Configurations		
Example Configuration #1	**Processor Info**	1x Pentium Dual Core E4500 (2.20GHz)
	Memory Info	2x512MB 667MHz
	Graphics Info	NVS290
	Disks/Optical/Floppy	1x160GB SATA / 1 Optical / 1 Floppy

Energy Consumption		**115 VAC LAN Enabled**	**115 VAC LAN Disabled**
	Windows Idle (S0)	67.4W	67.4W
	Windows Busy Typ(S0)	89.7W	89.7W
	Windows Busy Max (S0)	114.1W	114.1W
	Sleep (S3)	3.61W	2.82W
	Off (S5)	1.51W	1.30W
Declared Noise Emissions (Entry-level and High-end configurations)			
System Configuration (Entry level)	**Processor Info**	Single 3.00 GHz Intel Core2 Duo E6850 processor	
	Disks/Optical/Floppy	2x 80 GB 7200 rpm SATA; 1 DVD-ROM/ 1 Floppy	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power (LWAd, bels)**	**Deskside Sound Pressure (LpAm, decibels)**
	Idle	3.9 Bels	23 dB
	SATA Hard drive Operating (random reads)	4.2 Bels	25 dB
	Floppy Drive Operating (continuous copy)	4.7 Bels	29 dB
	DVD-ROM Operating (sequential reads)	5.1 Bels	38 dB
System Configuration (High-end)	**Processor Info**	Single 3.00 GHz Intel Core2 Extreme QX6850 processor	
	Graphics Info	NVIDIA Quadro FX 4600	
	Disks/Optical/Floppy	1x 146 GB 15K rpm SAS / 1 DVD-ROM / 1 Floppy	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power (LWAd, bels)**	**Deskside Sound Pressure (LpAm, decibels)**
	Idle	4.6 Bels	27 dB
	SATA Hard drive Operating (random reads)	5.2 Bels	35 dB
	Floppy Drive Operating (continuous copy)	5.0 Bels	32 dB
	DVD-ROM Operating (sequential reads)	5.3 Bels	38 dB

Physical Security and Serviceability	
Access Panel	Tool-less
Optical Drive	Tool-less
Floppy Drive	Tool-less

System Technical Specifications

Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Requires T-15 Torx or flat blade screwdriver to remove heatsink
Green User Touch Points	Yes, on tool-free internal chassis mechanisms
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less, can be upgraded without removing any internal components
System Board	Tool-less removal
Dual Color Power and HD LED on Front of Computer	green - normal red - fault
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Restore CD Set	Restores the computer to its original factory shipping image
Dual Function Front Power Switch	Also acts as a reset switch when held for 4 seconds
Padlock Support	Padlock loop in rear of chassis. Locks side cover and secures chassis from theft. (0.22" diameter)
Cable Lock Support	Kensington lock slot in rear of chassis. Locks side cover and secures chassis from theft. (3mm x 7mm opening)
Universal Chassis Clamp Lock Support	Threaded feature in rear of chassis. Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable.
Solenoid Lock and Hood Sensor	Yes
Rear Port Control Cover	Locks rear IO cables to prevent cable theft.
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	User can prevent the workstation from writing to or booting from removable media
Power-On Password	Prevents an unauthorized person from booting up the computer
Setup Password	Prevents an unauthorized person from changing the system configuration
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Cooling Solutions	Cooling Solutions
Power Supply Fans	92 mm x 92 mm x 25 mm 3-wire fan (non-serviceable)
CPU Heatsink Fan(s)	80 mm x 80 mm x 15 mm 4-wire high frequency PWM
Chassis Fans	92 mm x 92mm x 25 mm 4-wire high frequency PWM

Insight Diagnostics	• HP Insight Diagnostics Offline Edition
	• The diagnostics utility enables you to perform testing and to view critical computer hardware and software configuration information from various sources. This utility enables you to:
	  ○ Run diagnostics
	  ○ View the hardware configuration of the system
	• Key features and benefits
	• HP Insight Diagnostics simplifies the process of effectively identifying, diagnosing, and isolating the hardware issues. In addition to robust management tools, service tools can be

	invaluable in quickly resolving system problems. To streamline the service process and resolve problems quickly, it is necessary to have the right information available at the time that a service call is placed. The primary information requirement, which is also the one that provides the greatest insight into potential system issues, is the configuration of the system. Insight Diagnostics helps provide higher system availability. Typical uses of the Insight Diagnostics are: ○ Testing and diagnosing apparent hardware failures ○ Documenting system configurations for upgrade planning, standardization, inventory tracking, disaster recovery, and maintenance ○ Sending configuration information to another location for more in-depth analysis
ACPI-Ready Hardware	● Advanced Configuration and Power Management Interface (ACPI) ○ Allows the system to wake from a low power mode ○ Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system

BIOS	
BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal
PCI 3.0 Support	Full BIOS support for PCI Express through industry-standard interfaces
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
BIOS Power On	Users can define a specific date and time for the system to power on.
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS
Replicated Setup	Saves BIOS settings to diskette or USB flash device in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Setup Utility (F10)
SMBIOS	System Management BIOS 2.5, previously known as DMI BIOS, for system management information
Memory Change Alert	Alerts management console if memory is removed or changed
Thermal Alert	Monitors the temperature state within the chassis. Three modes: ● NORMAL - normal temperature ranges ● ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown ● SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
ACPI (Advanced Configuration and Power Management Interface)	● Allows the system to enter and resume from low power modes (sleep states) ● Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system ● Supports ACPI 2.0 for full compatibility with 64-bit operating systems
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen

System Technical Specifications

Remote Wakeup/Remote Shutdown	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.
ASF 2.0 Compliant	Allows workstation status to be monitored on a remote console.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system
ROM revision levels	Identifies system ROM revision levels and reports in Computer Setup Utility (F10).
System board revision level	• Allows management SW to read revision level of the system board • Revision level is digitally encoded into the HW and cannot be modified
Start-up Diagnostics (Power-on Self-Test)	Yes
Industry Standard Specification Support	
Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 2.0
ASF	Alert Standard Format Specification, Version 2.0
CD Boot	"El Torrito" Bootable CD-ROM Format Specification Version 1.0
EDD	• Enhanced Disk Drive Specification Version 1.1 • BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	• PCI Local Bus Specification, Revision 2.3 • PCI Power Management Specification, Revision 1.1 • PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	• PCI Express Base Specification, Revision 1.1 • PCI Express Base Specification, Revision 2.0
PMM	POST Memory Manager Specification, Version 1.01
SATA	• Serial ATA Specification, Revision 1.0a • Serial ATA 3 Gb/s: Extensions to Serial ATA 1.5 Gb/s, Revision 1.0
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Computing Group TPM Specification Version 1.2
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB 1.1	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification
SMBIOS	System Management BIOS Reference Specification, Version 2.5

System Software Management and Updating	
HP Client Management Solutions	Visit: http://www.hp.com/go/easydeploy
Product Change	• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by e-mail to customers, based on a user-defined profile. • PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition. • Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.

System Technical Specifications

Support Software CD & WWW	Yes
Social and Environmental Responsibility	
Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • US Energy Star (energy-saving features available on selected configurations -Windows only) • US Federal Energy Management Program (FEMP) • China Energy Conservation Program • IT ECO declaration • Japan PC Green label* * This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'
Batteries	This product complies with ISO standards: • EU Directive 91/ 157/ EEC • EU Directive 93/ 86/ EEC • EU Directive 98/ 101/ EEC Batteries used in the product do not contain: • Mercury greater than 5ppm by weight • Cadmium greater than 10ppm by weight • Lead greater than 4000ppm by weight Battery size: CR2032 (coin cell) Battery type: Lithium
Restricted Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html): • Asbestos • Certain Azo Colorants • Certain Brominated Flame Retardants - may not be used as flame retardants in plastics • Cadmium • Chlorinated Hydrocarbons • Chlorinated Paraffins • Formaldehyde • Halogenated Diphenyl Methanes • Lead carbonates and sulfates • Lead and Lead compounds • Mercuric Oxide Batteries • Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user. • Ozone Depleting Substances • Polybrominated Biphenyls (PBBs) • Polybrominated Diphenyl Ethers (PBBEs) • Polybrominated Biphenyl Oxides (PBBOs) • Polychlorinated Biphenyl (PCB) • Polychlorinated Terphenyls (PCT) • Polyvinyl Chloride (PVC), except for wires and cables and certain retail packaging, has been voluntarily removed from most applications. • Radioactive Substances • Tributyl Tinches (TBT), Triphenyl Tinches (TPT), Tributyl Tin Oxide (TBTO)
Packaging	HP follows these guidelines to decrease the environmental impact of product packaging: •

	• Eliminate the use of heavy metals such as lead, chromium, mercury, and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

Longevity and Upgrading	• This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradability features contained in the product include:
	• Intel LGA775 processor socket
	• 12 USB ports
	  ○ 7 rear
	  ○ 3 internal - 1 Type A
	  ○ 2 front
	• 3 PCI slots
	• 4 PCI Express slots
	  ○ 1 PCI Express ×1 slot
	  ○ 2 Gen2 PCI Express ×16 slots

Packaging Materials	
External	Cardboard carton and insert: 2.70 kg
Internal	LDPE Foam: 0.35 kg
End-of-Life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered, or disposed of in a responsible manner. [link to new HP white paper now in progress] Global Citizenship Report: http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications: http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment:
Service, Support and Warranty	On-site Warranty and Service (Note 1): One and three-years, limited warranty and service offering delivers on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 8am - 5pm. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering **NOTE 1:** Terms and conditions may vary by country. Certain restrictions and exclusions apply. **NOTE 2:** On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country. **NOTE 3:** Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043. • This product contains 0% recycled materials (by wt.) • This product is >90% recyclable when properly disposed of at end of life.
OS	NA

Processor 1	NA
Processor 2	NA
Memory	NA
Hard Drive	NA
Controller	NA
Optical Drive	NA
Graphics	NA
Floppy Disk Drive	NA
Keyboard	NA
Mouse	NA

Processors

Intel Core 2 Quad Q9650 Processor / 3.00 GHz, 12 MB L2 cache, 1333 MHz FSB	FN699AV
Intel Core 2 Quad Q9400 Processor / 2.66 GHz, 6 MB L2 cache, 1333 MHz FSB	
Intel Core 2 Quad Q8400 Processor / 2.66 GHz, 4 MB L2 cache, 1333 MHz FSB	
Intel Core 2 Quad Q9550 Processor / 2.83 GHz, 12 MB L2 cache, 1333 MHz FSB	KD172AV
Intel Core 2 Quad Q9300 Processor / 2.50 GHz, 6 MB L2 cache, 1333 MHz FSB	KD174AV
Intel Core 2 Quad Q8300 Processor / 2.50 GHz, 4 MB L2 cache, 1333 MHz FSB	NQ408AV
Intel Core 2 Duo E8600 Processor / 3.33 GHz, 6 MB L2 (shared), 1333 MHz FSB	FN698AV
Intel Core 2 Duo E8500 Processor / 3.16 GHz, 6 MB L2 (shared), 1333 MHz FSB	KD175AV
Intel Core 2 Duo E8400 Processor / 3.00 GHz, 6 MB L2 (shared), 1333 MHz FSB	KD176AV
Intel Core 2 Duo E7600 Processor / 3.06 GHz, 3 MB L2 cache,1066 MHz FSB	
Intel Core 2 Duo E7500 Processor / 2.93 GHz, 3 MB L2 cache,1066 MHz FSB	NQ410AV

Speeds	System Bus Frequency	Cache Type
3.00 GHz	1333 MHz FSB	12 MB L2 (shared)
2.83 GHz	1333 MHz FSB	12 MB L2 (shared)
2.50 GHz	1333 MHz FSB	6 MB L2 (shared)
2.50 GHz	1333 MHz FSB	4 MB L2 (shared)
3.33 GHz	1333 MHz FSB	6 MB L2 (shared)
3.16 GHz	1333 MHz FSB	6 MB L2 (shared)
3.00 GHz	1333 MHz FSB	6 MB L2 (shared)
2.93 GHz	1333 MHz FSB	3 MB L2 (shared)

Intel Pentium Dual-Core E5200 Processor / 2.50 GHz, 2 MB L2 cache, 800 MHz FSB	NQ409AV

Speeds	System Bus Frequency	Cache Type
2.50 GHz	800 MHz FSB	2 MB L2 (shared)

Technical Specifications - Hard Drives

HP SAS (Serial Attached SCSI) Hard Drives for HP Workstations	**450GB SAS 15K rpm 3Gb/s 3.5" HDD**	**Capacity**	450 GB	
		Height	1 in; 2.5 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.2 cm
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
			Average	3.6 ms
			Full Stroke	6.6 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	879, 097, 968 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	300GB SAS 15K rpm 3Gb/s 3.5" HDD	**Capacity**	300 GB	
		Height	1 in; 2.5 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.2 cm
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
			Average	3.5 ms
			Full Stroke	6.7 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	585,937,500 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	146GB SAS 15K rpm 3Gb/s 3.5" HDD	**Capacity**	146 GB	
		Height	1 in; 2.5 cm	
		Width	**Media Diameter**	3.5 in; 8.9 cm
			Physical Size	4 in; 10.2 cm
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
			Average	3.5 ms
			Full Stroke	6.7 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	286,749,488 - 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 3°5 C)	

Technical Specifications - Hard Drives

SATA (Serial ATA) Hard Drives for HP Workstations	**300GB SATA 10K rpm SFF in 3.5" Frame HDD**	**Capacity**	300,069,052,416 bytes	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	2.5 in; 6.36 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Cache	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7 ms (maximum)
			Average	4.4 ms
			Full Stroke	9.5 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	586,072,368	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	160GB SATA 10K rpm SFF in 3.5" Frame HDD	**Capacity**	160,041,885,696 bytes	
		Height	1 in; 2.54 cm	
		Width	**Media Diameter**	2.5 in; 6.36 cm
			Physical Size	4 in; 10.17 cm
		Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Cache	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7 ms (maximum)
			Average	4.4 ms
			Full Stroke	9.5 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	312,581,808	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	80GB SATA 10K rpm SFF in 3.5" Frame HDD	**Capacity**	80,026,361,856 bytes	
		Height	1 in; 2.5 cm	
		Width	**Media Diameter**	2.5 in; 6.36 cm
			Physical Size	4 in; 10.2 cm
		Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Buffer	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7 ms (maximum)
			Average	4.4 ms
			Full Stroke	19.5 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	156,301,488	
		Operating Temperature	41° to 131° F (5° to 55° C)	

1000GB (1TB) SATA 7200 rpm 3.0Gb/s 3.5" HDD	**Capacity**	1,000,204,886,016 bytes	
	Height	1 in; 2.5 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.2 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Buffer	32 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	1,953,525,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
500GB SATA 7200 rpm 3Gb/s 3.5" HDD	**Capacity**	500,107,862,016 bytes	
	Height	1 in; 2.5 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.2 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	300 MB/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
250GB SATA 7200 rpm 3Gb/s 3.5" HDD (for HP xw-Workstations)	**Capacity**	250,059,350,016 bytes	
	Height	1 in; 2.5 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.2 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	

	Operating Temperature	41° to 131° F (5° to 55° C)	
160GB SATA 7200 rpm 3Gb/s 3.5" HDD	**Capacity**	160,041,885,696 bytes	
	Height	1 in; 2.5 cm	
	Width	**Media Diameter**	3.5 in; 8.9 cm
		Physical Size	4 in; 10.2 cm
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	11 ms
		Full Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drive Controllers

LSI 3041E 4-Port SAS 3.0 Gb/s RAID Card	**PCI Bus**	PCI-Express x4 lanes	
	PCI Modes	Bus Master DMA	
	RAID Levels	RAID 0, 1, 1E and 10E	
	PCI Data Burst Transfer Rate	250MB/s per lane half duplex 500MB/s per lane full duplex 1000MB/s 4-lane half duplex	
	SAS Bandwidth	**Half Duplex**	Single lane - 300 MBps Wide Port (2 lanes) - 600 MBps Wide Port (4 lanes) - 1200 MBps
		Full Duplex	Single SAS Lane - 600 MBps Wide Port (2 lanes) -1200 MBps Wide Port (4 lanes) - 2400 MBps
	PCI Card Type	3.3 volt add-in card	
	PCI Voltage	12 V ± 10%	
	PCI Power	7.5 Watts	
	Bracket	Full height and Low-profile	
	Certification Level	PCI-Express 1.0a	
	IO Bus	Four 3Gbps SAS/SATA ports	
	SAS Processor	LSISAS1064E	
	Internal Connectors	Four- SATA x1 connectors	
	External Connectors	None	
	Maximum Number of SCSI DeviceS	122	
	LED Indicators	On-board activity and fault LEDs	
	Integrated Mirroring	Integrated Mirroring option available	

LSI MegaRAID®SAS 8888ELP Host Bus Adapter (HBA)	**PCI Bus**	PCI-Express x8 lanes
	PCI Modes	Bus Master DMA
	RAID Levels	RAID 0, 1, and 5 RAID spans 10 and 50
	PCI Data Burst Transfer Rate	Up to 3Gb/s per port
	Full Duplex	Up to 1.5 GB/s
	PCI Voltage	+3.3V Add-in Card
	PCI Power	7.5 Watts
	Certification Level	PCI-Express 1.0a
	IO Bus	Eight 3Gb/s SAS/SATA ports
	Internal Connectors	Two SAS SFF8087 x4
	External Connectors	Two SAS SFF8088 x4
	Maximum Number of SCSI DeviceS	32
	LED Indicators	Connector LEDs indicate whether the internal or external connector is active for ports 0-3 and 4-7

Technical Specifications - Graphics

NVIDIA Quadro NVS 290 256 MB PCIe Graphics Card	**Form Factor**	Low Profile
	Bus Type	PCIe x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DMS-59, includes DMS-59 to Dual DVI-I cable. DMS-59 to Dual VGA cable available as an option.
	Maximum Resolution	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft®Windows®
	RAMDAC	Integrated dual 400MHz
	Image Quality Features	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	Programmable Video Processor	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	Display Output	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft®Windows®
	Supported Graphics APIs	OGL 2.1 & DX10 Support; Shader Model 4.0
	Available Graphics Drivers	Genuine Windows Vista Business(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit)(Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode) Red Hat Enterprise Linux(RHEL) WS3, WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html. Novell SUSE Linux Enterprise drivers may be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	High-Resolution AntiAliasing	Color planes: 32-bit color buffer Overlay planes: Hardware supported
	Option kit contents	NVIDIA Quadro NVS 290 (256 MB DH) PCIe Graphics Card with full height bracket attached, DMS-59 to Dual DVI cable, Workstation Software Driver CD, documentation.

Technical Specifications - Graphics

NVIDIA Quadro NVS 295 256MB Graphics Card	**Form Factor**	2.731 inches (H) × 6.600 inches (L), Half-Height
	Graphics Controller	NVIDIA Quadro NVS 295 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort Comes with 2 DisplayPort to DVI-D Adapters ('DisplayPort to VGA' and 'DisplayPort to DL DVI' adapters available as an accessory)
	Maximum Resolution	Two DisplayPort outputs drive two digital displays up to 2560 x 1600 **NOTE:** This card supports up to two displays
	Display Output	• Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking • Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking (through DisplayPort to DVI-D (single link) cable)
	Supported Graphics APIs	OpenGL 3.0 DirectX 10.0
	Available Graphics Drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Power consumption	22.69 Watts
NVIDIA Quadro NVS 450 512 MB PCIe Graphics Card	**Form Factor**	ATX Full Height, 1/2 length Passive cooling
	Bus Type	PCI Express x16, Generation 2.0
	Memory	512 MB GDDR3 (256MB per GPU)
	Connectors	Four DisplayPort; Four DisplayPort to DVI-D adapters included. ('DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
	Maximum Resolution	DisplayPort connectors support ultra-high-resolution panels (up to 2560 x 1600) **NOTE:** This card supports up to four displays
	Supported Graphics APIs	OpenGL 3.0 Direct X 10.0
	Available Graphics Drivers	Genuine Microsoft Windows Vista(64-bit and 32-bit), Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html. Novell SUSE Linux Enterprise drivers may be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	Power consumption	35 Watts

Technical Specifications - Graphics

ATI FirePro V3700 256MB Graphics Card	**Form Factor**	4.40 inches (H) × 6.70 inches (L) (11.18 cm (H) × 17.02 cm (L))
	Graphics Controller	ATI FirePro V3700 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 Dual Link DVI-I Two DVI-I to VGA adapters included
	Maximum Resolution	Two dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz or two analog displays at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	Shading architecture	Full Shader Model 4.0 • 40 Stream Processing Units • Dynamic load balancing and resource allocation for vertex, geometry, and pixel shaders • Common instruction set and texture unit access supported for all types of shaders • Dedicated branch execution units and texture address processors
	Supported graphics APIs	OpenGL 3.0 DirectX 10.1
	Available graphics drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux 4 (64-bit and 32-bit) Red Hat Enterprise Linux 5 Desktop (64-bit and 32-bit) SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Power consumption	32 Watts

NVIDIA Quadro FX 380 256MB Graphics Card	**Form Factor**	4.376 inches (H) × 6.60 inches (L)
	Graphics Controller	NVIDIA Quadro FX 380 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	256 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 Dual Link DVI-I Two DVI-I to VGA adapters included
	Maximum Resolution	Two dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz or two analog displays at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	RAMDAC	Dual Internal 400 MHz DAC
	Shading architecture	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) • Long fragment programs (unlimited instructions) • Long vertex programs (unlimited instructions) • Looping and subroutines (up to 256 loops per vertex program) • Dynamic flow control • Conditional execution
	Supported graphics APIs	OpenGL 3.0 Direct X 10.0
	Available graphics drivers	Genuine Windows Vista Business(64-bit and 32-bit) Microsoft Windows XP Professional(64-bit and 32-bit)

		Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	High-level Shader Languages	• Optimized compiler for Cg and Microsoft HLSL • OpenGL 2.1 and DirectX 10 support • Open source compiler
	CUDA™Parallel Processor Cores	16
	Power consumption	33.91 Watts
NVIDIA Quadro FX 580 512MB Graphics Card	**Form Factor**	4.376 inches (H) × 6.60 inches (L)
	Graphics Controller	NVIDIA Quadro FX 580 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	512MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI adapter included ('DVI to VGA', 'DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
	Maximum Resolution	• Two DisplayPort outputs drive two digital displays up to 2560 x 1600 • One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	RAMDAC	Single Internal 400 MHz DAC
	Shading architecture	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) • Long fragment programs (unlimited instructions) • Long vertex programs (unlimited instructions) • Looping and subroutines (up to 256 loops per vertex program) • Dynamic flow control • Conditional execution
	Supported graphics APIs	OpenGL 3.0 Direct X 10.0
	Available graphics drivers	Genuine Windows Vista Business(64-bit and 32-bit) Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	High-level Shader Languages	• Optimized compiler for Cg and Microsoft HLSL • OpenGL 2.1 and DirectX 10 support • Open source compiler
	CUDA™Parallel Processor Cores	32

Technical Specifications - Graphics

	Power consumption	40 Watts
ATI FirePro V5700 512MB Graphics Card	**Form Factor**	4.40 inches (H) × 6.70 inches (L) (11.18 cm (H) × 17.02 cm (L))
	Graphics Controller	ATI FirePro V5700 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	512 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI adapter included ('DVI to VGA', 'DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
	Maximum Resolution	• Two DisplayPort outputs drive two digital displays up to 2560 x 1600 • One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	Shading architecture	Full Shader Model 4.0 • 320 Stream Processing Units • Dynamic load balancing and resource allocation for vertex, geometry, and pixel shaders • Common instruction set and texture unit access supported for all types of shaders • Dedicated branch execution units and texture address processors
	Supported graphics APIs	OpenGL 3.0 DirectX 10.1
	Available graphics drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux 4 (64-bit and 32-bit) Red Hat Enterprise Linux 5 Desktop (64-bit and 32-bit) SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Power consumption	56 Watts

Technical Specifications - Graphics

NVIDIA Quadro FX 1800 768MB Graphics Card	**Form Factor**	4.376 inches (H) x 7.8 inches (L)
	Graphics Controller	NVIDIA Quadro FX 1800 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	768MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI-D adapter included ('DVI to VGA', 'DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
	Maximum Resolution	• Two DisplayPort outputs drive two digital displays up to 2560 x 1600 • One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	RAMDAC	Single Internal 400 MHz DAC
	Shading Architecture	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) • Long fragment programs (unlimited instructions) • Long vertex programs (unlimited instructions) • Looping and subroutines (up to 256 loops per vertex program) • Dynamic flow control • Conditional execution
	Supported Graphics APIs	OpenGL 3.0 Direct X 10.0
	Available Graphics Drivers	Genuine Windows Vista Business(64-bit and 32-bit) Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	High-level Shader Languages	• Optimized compiler for Cg and Microsoft HLSL • OpenGL 2.1 and DirectX 10 support • Open source compiler
	CUDA™Parallel Processor Cores	64.
	Power consumption	59 Watts

Technical Specifications - Graphics

ATI FirePro V7750 1.0GB Graphics Card	**Form Factor**	4.40 inches (H) × 13.0 inches (L) (11.18 cm (H) × 33.02 cm (L))
	Graphics Controller	ATI FirePro V7750 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	1024 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI adapter included ('DVI to VGA', 'DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
	Maximum Resolution	• Two DisplayPort outputs drive two digital displays up to 2560 x 1600 • One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	Shading architecture	Full Shader Model 4.0 • 320 Stream Processing Units • Dynamic load balancing and resource allocation for vertex, geometry, and pixel shaders • Common instruction set and texture unit access supported for all types of shaders • Dedicated branch execution units and texture address processors
	Supported graphics APIs	OpenGL 3.0 DirectX 10.1
	Available graphics drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux 4 (64-bit and 32-bit) Red Hat Enterprise Linux 5 Desktop (64-bit and 32-bit) SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Power consumption	76 Watts
NVIDIA Quadro FX 3800 1.0GB Graphics Card	**Form Factor**	4.376 inches (H) x 9.0 inches (L) Single slot card
	Graphics Controller	NVIDIA Quadro FX 3800 Graphics Board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	1GB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I. One DisplayPort to DVI-D adapter included ('DVI to VGA', 'DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
	Maximum Resolution	• Two DisplayPort outputs drive two digital displays up to 2560 x 1600 • One dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz or one analog display at resolutions up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	RAMDAC	Single Internal 400 MHz DAC
	Shading architecture	Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class)

		• Long fragment programs (unlimited instructions) • Long vertex programs (unlimited instructions) • Looping and subroutines (up to 256 loops per vertex program) • Dynamic flow control • Conditional execution
	Supported graphics APIs	OpenGL 3.0 Direct X 10.0
	Available graphics drivers	Genuine Windows Vista Business(64-bit and 32-bit) Microsoft Windows XP Professional(64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Novell SUSE Linux Enterprise drivers may be obtained from: ftp://download.nvidia.com/novell or http://www.nvidia.com
	High-level Shader Languages	• Optimized compiler for Cg and Microsoft HLSL • OpenGL 2.1 and DirectX 10 support • Open source compiler
	CUDA™Parallel Processor Cores	192
	Power consumption	107.9 Watts
NVIDIA Quadro FX 4800 1.5GB PCIe Graphics Card	**Form Factor**	4.36" (H) x 10.5" (L) Dual slot card
	Graphics Controller	NVIDIA Quadro FX 4800 graphics board
	Bus Type	PCI Express x16, Generation 2.0
	Memory	1.5 GB GDDR3 SDRAM unified graphics memory
	Connectors	2 DisplayPort, 1 Dual-Link DVI-I, 1 3-pin Mini DIN stereo output, One DisplayPort to DVI-D adapter included ('DVI to VGA', 'DisplayPort to VGA' and 'DisplayPort to Dual Link DVI' adapters available as an accessory)
	Maximum Resolution	• 2 DisplayPort connectors support ultra-high-resolution panels (up to 2560 x 1600) • Dual-link DVI-I output drives one digital display at resolutions up to 2560 x 1600 @ 60Hz • Internal 400 MHz DACs-One analog display up to 2048 x 1536 @ 85Hz **NOTE:** This card supports up to two displays
	Shading Architecture	• Full Shader Model 4.0 (OpenGL 2.1/DirectX 10 class) • Long fragment programs (unlimited instructions) • Long vertex programs (unlimited instructions) • Looping and subroutines (up to 256 loops per vertex program) • Dynamic flow control • Conditional execution
	Supported Graphics APIs	OpenGL 3.0 Direct X 10.0
	Available Graphics Drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Red Hat Enterprise Linux(RHEL) WS4 & 5 Desktop/Workstation Qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html Novell SUSE Linux Enterprise drivers may be obtained from:

		ftp://download.nvidia.com/novell or http://www.nvidia.com
	High-Resolution AntiAliasing	• Rotated Grid Full-Scene Antialiasing (RG FSAA) • 32xFSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920 x 1200 • 64x FSAA SLI Mode
	High-level Shader Languages	• Optimized compiler for Cg and Microsoft HLSL • OpenGL 2.1 and DirectX 10 support • Open source compiler
	Power consumption	146 Watts
Elemental Accelerator Software for NVIDIA Quadro	**Form Factor**	Drop in box CD

Technical Specifications - Multimedia and Audio Devices

HP Thin USB Powered Speakers	**Frequency Response** (-3dB, 24-bit/96kHz input)	FO to 20kHz
	Dimensions	Speakers: 5.72 x 3.74 x 0.96 in (14.52 x 9.50 x 2.45 cm) per speaker
	On/Off/Volume Controls	Right side of right speaker
	Power LED	Front of right speaker (green)
	Watts	2/3 watt (normal/maximum)
	Net weight	0.68 lbs (0.31kg)
	Environmental (all conditions non-condensing)	**Temperature** (operating): 14° to 104° F (-10° to 40° C)
		Relative Humidity (operating): 40% to 90%
	Speaker cable length	Input cord: 5.91 ft (1800mm±35mm) L-channel cord: 3.28 ft (1000mm±35mm) USB cord: 5.91 ft (1800mm±35mm)
	Color	HP Carbonite
	Kit Contents	One pair of HP Thin USB Powered Speakers with attached audio signal and USB power cables for connecting to your PC HP Warranty documentation

SoundBlaster X-Fi XtremeGamer Audio Card (PCI)	**24-bit Analog-to-Digital conversion of analog inputs**	96kHz sample rate
	24-bit Digital-to-Analog conversion of digital sources	96kHz to analog 7:1 speaker output
	24-bit Digital-to-Analog conversion of stereo digital sources	8, 11.025, 16, 22.05, 24, 32, 44.1, 48 and 96kHz
	16-bit to 24-bit recording sampling rates	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz, 24-bit/48kHz and 24-bit/96kHz with direct monitoring
	Enhanced SoundFont support	Up to 24-bit resolution
	Signal-to-Noise Ratio (2okHz Low-pass filter, A-Weighted)	Stereo Output 109dB Front and Rear Channels 109dB Center, Subwoofer and Side Channels 109dB
	Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter)	0.004%
	Frequency Response (-3dB, 24-bit/96kHz input)	10Hz to 46kHz
	Frequency Response (-3dB, 24-bit/192kHz input)	10Hz to 46kHz
	Speaker and Headphone connections	Stereo to 7.1 (Line Out via three 3.5mm mini jacks)
	Flexijack	Line In/ Microphone In/Optical Outi via shared 3.5mm mini jack

Technical Specifications - Multimedia and Audio Devices

Auxiliary Line Level Input	4-pin molex connector
Front Panel Header	Intel HD Audio Compatible (1x10 pin)
Operating System	EntMicrosoft Windows Vista Business 64 Microsoft Windows Vista Business 32 Microsoft®Windows®XP Professional SP2 Microsoft Windows XP Professional x64 Edition

Technical Specifications - Optical and Removable Storage

NOTE: Actual speeds may vary. Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

HP DVD+/-RW Drive	**Description**	5.25-inch, half-height, tray-load		
	Mounting Orientation	Either horizontal or vertical		
	Interface Type	SATA/ATAPI		
	Dimensions (WxHxD)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
	Disc Formats	DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW		
	Disc Capacity	**DVD-ROM**	8.5 GB DL or 4.7 GB standard	
		Full Stroke DVD	< 250 ms (seek)	
		Full Stroke CD	< 210 ms (seek)	
	Maximum Data Transfer Rates	**CD ROM Read**	CD-ROM, CD-R Up to 40X CD-RW Up to 32X	
		DVD ROM Read	DVD-RAM	Up to 12X
			DVD+RW	Up to 8X
			DVD-RW	Up to 8X
			DVD+R DL	Up to 8X
			DVD-R DL	Up to 8X
			DVD-ROM	Up to 16X
			DVD-ROM DL	Up to 8X
			DVD+R	Up to 16X
			DVD-R	Up to 16X
	Power	**Source**	SATA DC power receptacle	
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p	
		DC Current	5 VDC -1000 mA typical, 1600 mA maximum 12 VDC -600 mA typical, 1400 mA maximum	
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)	
		Relative Humidity	10% to 90%	
		Maximum Wet Bulb Temperature	86° F (30° C)	
		Operating Systems Supported	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS3, WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10 No driver is required for this device. Native support is provided by the operating system.	

			* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements. * LightScribe functionality is not natively supported by Linux distributions. Customers may download LightScribe Linux drivers from: http://www.lightscribe.com/downloadSection/linux/index.aspx
	Kit Contents		HP SATA SuperMulti LightScribe DVD Writer drive, LightScribe software, Roxio Easy Media Creator software, Intervideo WinDVD Software, installation guide, and DVD+R media.

HP DVD-ROM Drive	**Description**		5.25-inch, half-height, tray-load
	Mounting Orientation		Either horizontal or vertical
	Interface Type		SATA/ATAPI
	Dimensions (WxHxD)		5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)
	Disc Capacity	**DVD-ROM**	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB
	Access Times	**DVD-ROM Single Layer**	< 140 ms (typical)
		CD-ROM Mode 1	< 125 ms (typical)
		Full Stroke DVD	< 250 ms (seek)
		Full Stroke CD	< 210 ms (seek)
	Power	**Source**	SATA DC power receptacle
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum
	Operating Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative Humidity	10% to 90%
		Maximum Wet Bulb Temperature	86° F (30° C)
		Operating Systems Supported	Windows Vista Business 64* Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS3, WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10 No driver is required for this device. Native support is provided by the operating system. * Certain Windows Vista product features

require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

HP 16-In-1 Media Card Reader with PCI Card

Interface Type	USB 2.0 High-speed device	
Dimensions (WxHxD)	5.7 x 5.86 x 1.68 in (145 x 148.9 x 42.7 mm)	
Supported Media Types	MicroSD (T-Flash, including MicroSD HC) Memory Stick Micro MS Micro (M2)	
Operating Environmental (all conditions non-condensing)	**Temperature**	Operating Extremes Test Parameters/Conditions - Power applied, unit operating on system ±5% nominal supply voltage. 10°C 10% R.H. ≥ 24 hours 10°C 90% R.H. ≥ 24 hours 20°C 90% R.H. ≥24 hours 30°C 90% R.H. ≥ 24 hours 40°C 90% R.H. ≥ 24 hours 50°C 90% R.H. ≥ 24 hours 50°C 10% R.H. ≥ 24 hours Storage Extremes Test Parameters/Conditions 60°C @ 80% R.H. for 96 hours -30°C @ 20% R.H. for 48 hours No power applied Delta °C < 1.0°C/min Delta % R.H. < 1.5% R.H./min
Certifications/Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.2 FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUV-T	
Operating Systems Supported	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. No driver is required for this device. Native support is provided by the operating system. * Certain Windows Vista product features require advanced or additional hardware. See http://www.microsoft.com/windowsvista/getready/hardwarereqs.mspx and http://www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit http://www.windowsvista.com/upgradeadvisor. Windows Vista Business disk also included for future upgrade if desired. For Windows Vista system requirements, visit http://www.windowsvista.com/systemrequirements.	
Kit Contents	Media reader in 5.25" bracket with USB cable attached, PCI card with full height bracket attached, ½height bracket for PCI card, Install Guide, IO & Security Software and Documentation CD	
Weight	4 lbs (1.81 kg)	

Advance Protocol Support	Supports hardware ECC (Error Correction Code) function Supports hardware CRC (Cyclic Redundancy Check) function Supports MS 4-bit parallel transfer mode Supports MS-PRO 4-bit parallel transfer mode Supports SD 4-bit parallel transfer mode Supports high-speed 50Mhz SD 4-bit card (version 1.1) Support high-speed 52Mhz MMC 8-bit card (version 4.x)

NOTE: "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

Integrated Broadcom 5755 NetXtreme Gigabit Ethernet PCIe NIC	**Operating System Driver Support**	Red Hat Enterprise Linux(RHEL) WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10

Broadcom 5751 NetXtreme Gigabit Ethernet PCIe NIC	**Connector**	RJ-45
	Controller	Broadcom 5751 PCI-Express LAN Controller
	Memory	Integrated 96Kb frame buffer memory
	Data Rates Supported	10/100/1000 Mbps
	Compliance	IEEE 802.1P, 802.1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus Architecture	PCI-E
	Data Path Width	Single channel, PCI-E
	Data Transfer Mode	Bus-master DMA
	Hardware Certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power Requirement	3.1 watts @ +3.3V AUX supply with 5V tolerance
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex Half-duplex (not available for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Operating Temperature	32° to 131°F (0° to 55° C)
	Operating Humidity	85% at 131° F (55° C)
	Dimensions	4.4 x 2.2 x 0.08 in (11.2 x 5.5 x 2 cm)
	Operating System Driver Support	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat Enterprise Linux(RHEL) WS3, WS4, 5 Desktop/Workstation Novell SLES 9 & SLE 10 No driver is required for this device. Native support is provided by the operating system. * Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.
	Management Capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Broadcom mgmt utility
	Kit Contents	Broadcom 5751, CD, Broadcom 5751 Netxtreme Gigabit PCIe NIC, drivers, quick install guide, product warranty statement

Technical Specifications - Controller Cards

HP FireWire/IEEE 1394a PCI Card	**Data Transfer Rate**	Burst Data Rate up to 400 Mbps
	Device Interface Protocol	IEEE-1394a
	Devices Supported	IEEE-1394 compliant devices
	Bus Type	PCI card with brackets for low profile and full height PCI slots.
	Certification Level	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC
	Ports	Two IEEE 1394 6-Pin Connector (Rear)
	Internal Connectors	One 10-Pin (9 Contacts) Custom Connector
	System Requirements	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. No driver is required for this device. Native support is provided by the operating system. * Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements. Pentium II 266 or above 128-MB RAM 1-GB Hard Drive CD-ROM drive Built-in sound system Available PCI slot
	Temperature - Operating	50° to 131° F (10° to 55° C)
	Temperature - Storage	-22° to 140° F (-30° to 60° C)
	Relative Humidity - Operating	20% to 80%
	Operating Systems Supported	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32* * Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit: http://www.windowsvista.com/systemrequirements.

Technical Specifications - Controller Cards

[i] Support for all peripherals and parts on Microsoft Windows Vista Business 64 is subject to the expected availability of Microsoft Vista Business 64 in CQ1 2008

Warranty - year(s) Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.