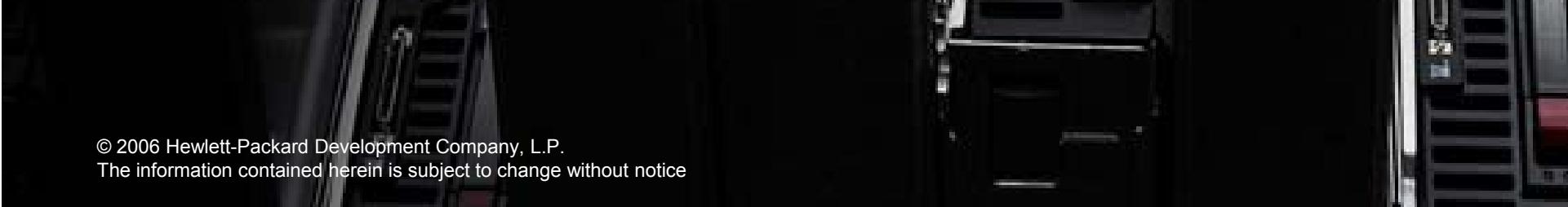


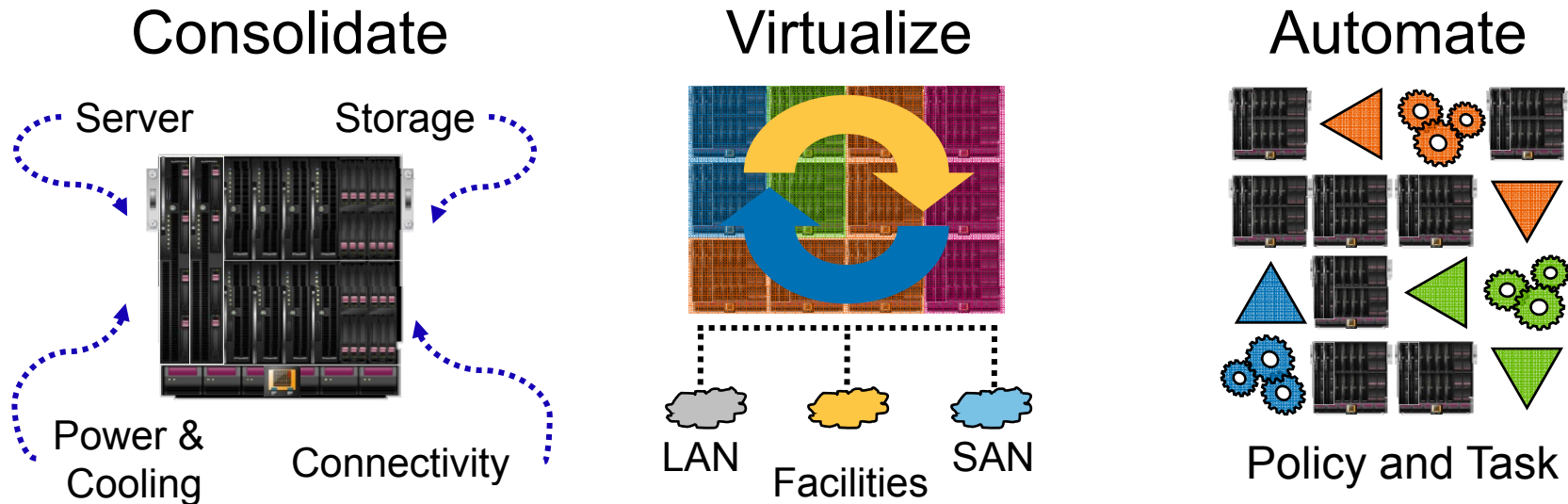


HP BladeSystems Infrastructure



© 2006 Hewlett-Packard Development Company, L.P.
The information contained herein is subject to change without notice

The HP BladeSystem approach to simplify infrastructure



-
- Modularize and integrate components
 - Surround with intelligence
 - Manage as one
 - Create logical, abstracted connection to LAN/SAN
 - Pool and share server, storage, network, and power
 - Simplify routine tasks and processes to save time
 - Keep control

Reduce time and cost to buy, build and maintain

Greater resource efficiency and flexibility

Free IT resources for revenue bearing projects

HP BladeSystem c-Class

Enclosure Family

c7000



An adaptive infrastructure in a box optimized for large data centers.

- Up to 16 server and storage bays
- 8 high-speed networking bays

c3000



Versatile, hassle-free BladeSystem enclosure ideal for small spaces with big computing needs.

- Up to 8 server and storage bays
- 4 high-speed networking bays

c3000 Tower



c7000 Enclosure

An adaptive infrastructure in a 17" box

Front View

Blades install in seconds

Integrated platform eliminates unnecessary components



10U

8-16 blades
Shared (3+3) power increases efficiency

Onboard Administrator
• Quick setup and troubleshooting

Rear View

New fan design saves power, airflow



Flexible Data center connectivity



Simple, efficient power connections

Results of Blade Everything: The industry's most complete portfolio

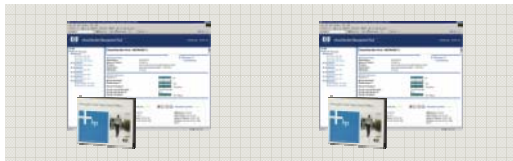
Enclosures



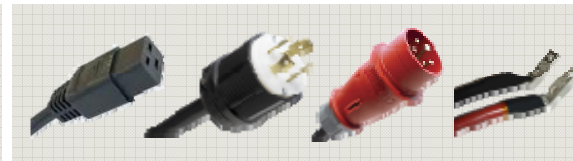
A Full Range of 2P and 4P Blades



Unified Management



Choice of Power



Services

Assessment
Implementation
Support

Interconnect choices for LAN, SAN, and Scale-Out Clusters

<p>Virtual Connect</p>	<p>LAN</p>	<p>Ethernet NICs</p>	<p>SAN</p>	<p>Fibre Channel</p>	<p>InfiniBand 4X DDR</p>
------------------------	------------	----------------------	------------	----------------------	--------------------------

HP ProLiant BL495c G5

Virtually the best blade



BL495c G5

Processor

Up to two Quad-core AMD Opteron™
2300 Series processors

Memory

PC2-5300 Registered DDR2 (667 MHz)
16 DIMM Sockets
128GB max (with 8GB DIMMs)

Internal Storage

2 NHP SATA SSD
No spinning media

Networking

2 integrated Multifunction 10Gb NICs
Additional NICs via mezzanine card

Mezzanine Slots

2 PCIe mezzanine expansion slots

Management

Integrated Lights Out 2
Standard Blade Edition

Density

16 server blades in 10U enclosure

ProLiant G6 Blade Portfolio



	ProLiant BL280c G6	ProLiant BL460c G6	ProLiant BL490c G6	ProLiant BL685c G6	ProLiant BL620c/680c G6
Processors	(2) Quad-Core Intel® Nehalem-EP Series	(2) Quad-Core Intel® Nehalem-EP Series	(2) Quad-Core Intel® Nehalem-EP Series	(4) Quad-Core AMD Opteron™ Series	(2/4) Quad-Core Intel® Nehalem-EX Series
Memory	96GB 12 Sockets DDR3	96GB 12 Sockets DDR3	144GB 18 Sockets DDR3	256GB 32 Sockets DDR2	1TB 32/64 Sockets DDR3
Internal Storage	SATA, SAS*, SSD 2 x 2.5" non-hot plug HP Embedded SATA RAID Controller	SATA, SAS 2 x 2.5" hot plug (SATA/SAS) Smart Array P410i	SSD 2 x non-hot plug (SSD) HP Embedded SATA Controller	SATA, SAS, SSD 2 x 2.5" hot plug (SATA/SAS) Smart Array P400i	SATA, SAS, SSD 2 x 2.5" hot plug (SATA/SAS) Smart Array P410i
Network Ports	(2) 1Gb Ethernet ports	(2) Multifunction 10Gb ports with Flex-10 support 8 FlexNICs standard	(2) Multifunction 10Gb ports with Flex-10 support 8 FlexNICs standard	(4) Multifunction 10Gb ports with Flex-10 support 16 FlexNICs standard	(4) Multifunction 10Gb ports with Flex-10 support 16 FlexNICs standard
I/O Slots	(2) PCI-e mezzanine slots	(2) PCI-e mezzanine slots	(2) PCI-e mezzanine slots	(3) PCI-e mezzanine slots	(3/6) PCI-e mezzanine slots
Additional Features	Internal USB port Internal SD card slot TPM 1.2 module	Internal USB port Internal SD card slot TPM 1.2 module	Internal USB port Internal SD card slot TPM 1.2 module	Internal USB port Internal SD card slot TPM 1.2 module	Internal USB port Internal SD card slot TPM 1.2 module



Model comparison

	HP ProLiant BL460c G5	HP ProLiant BL460c G6
Processors	Two dual- or quad-core Intel® Xeon®	Two dual- or quad-core Intel® Nehalem-EP Series
Memory	64GB 8 Sockets Fully-Buffered DDR2 667MHz	96GB 12 Sockets Registered or Unbuffered DDR3
Internal Storage	SATA, SAS 2 SFF hot-plug drive bays Smart Array E200i with 64MB cache RAID 0,1 Optional 128MB BBWC	SATA, SAS 2 SFF hot-plug drive bays Smart Array P410i RAID 0,1 Optional cache and battery-backed write cache
Network Ports	Two multifunction 1Gb Ethernet ports	Embedded dual-port Flex-10 10GbE Multifunction server adapter
I/O Slots	Two PCI Express mezzanine slots	Two PCI Express mezzanine slots
Integrated Management	iLO-2 Standard Blade Edition	ProLiant Onboard Administrator powered by iLO-2
Additional	Internal USB 2.0 connector	Internal USB 2.0 connector Internal SD card slot



invent

At-a-glance



HP ProLiant BL490c G6 server blade

Processor	<ul style="list-style-type: none">• Up to two Quad-Core Intel® Xeon® processor 5500 series
Memory	<ul style="list-style-type: none">• 18 DIMM Sockets; 144 GB maximum• DDR3 Registered or Unbuffered DIMMs
Internal Storage	<ul style="list-style-type: none">• 2 SFF non hot-plug drive bays (SSD only)• HP Embedded SATA Controller
Networking	<ul style="list-style-type: none">• Embedded dual-port Flex-10 10GbE Multifunction server adapter
Mezzanine Slots	<ul style="list-style-type: none">• Two (2) mezzanine slots; One (1) Type-1, one (1) Type-2
Additional Features	<ul style="list-style-type: none">• Internal USB 2.0 connector; Internal SD Card slot• TPM support
Management	<ul style="list-style-type: none">• ProLiant Onboard Administrator powered by iLO-2



Model comparison



	HP ProLiant BL480c	HP ProLiant BL490c G6
Processors	Two dual- or quad-core Intel® Xeon®	Two quad-core Intel® Nehalem-EP Series
Memory	48GB 12 Sockets Fully-Buffered DDR2 667MHz	144GB 18 Sockets Registered or Unbuffered DDR3
Internal Storage	SATA, SAS 4 SFF hot-plug SFF drive bays Smart Array P400i Optional 512MB battery-backed write cache RAID 0,1	SSD 2 SFF non hot-plug drive bays (SSD only) HP Embedded SATA Controller
Network Ports	Two multifunction 1Gb Ethernet ports Two 1Gb Ethernet ports	Embedded dual-port Flex-10 10GbE Multifunction server adapter
I/O Slots	Three PCI Express mezzanine slots	Two PCI Express mezzanine slots
Integrated Management	iLO-2 Standard Blade Edition	ProLiant Onboard Administrator powered by iLO-2
Additional Features	Internal USB 2.0 connector	Internal USB 2.0 connector Internal SD card slot TPM support
Density	8 blades in 10U; 4 blades in 6U	16 blades in 10U; 8 blades in 6U



Model comparison

	HP ProLiant BL685c G5	HP ProLiant BL685c G6
Processors	Four Quad-Core AMD Opteron™ 8300 Series	Four Quad-Core AMD Opteron™ 8300 Series; support for future processors
Memory	128GB 16 Sockets DDR2 667MHz	256GB 32 Sockets DDR2 800MHz
Internal Storage	SATA, SAS 2 x 2.5" hot plug bays Smart Array E200i Optional 128MB battery-backed write cache RAID 0,1	SATA, SAS, SSD 2 x 2.5" hot plug (SATA/SAS), or 2 x non-hot plug (SSD) Smart Array P400i Optional 512MB battery-backed write cache RAID 0,1
Network Ports	Two multifunction 1Gb Ethernet ports Two 1Gb Ethernet ports	Four multifunction 10Gb Ethernet ports with Flex-10 support
I/O Slots	Three PCI Express x8 mezzanine slots PCI expansion blade option	Three PCI Express x8 mezzanine slots PCI expansion blade option
Integrated Management	iLO 2 Standard Blade Edition	ProLiant Onboard Administrator
Additional Features	Internal USB port	Internal USB port Internal SD card slot TPM 1.2 module support
Density	8 blades in 10U; 4 blades in 6U	8 blades in 10U; 4 blades in 6U



invent













Takeaways

- BL460c G6
 - Next generation BL460c, adds horsepower & power efficiency
 - Will retain position as “World’s Most Popular Blade”
- BL490c G6
 - Intel-based “Virtualization Blade” that reduces cost per virtual machine



invent

HP Smart Array P410i Controller

Feature Set Comparison for BL460c G6			
	Zero Memory <i>Base Model</i>	256MB or 512MB Cache <i>Greater performance & reliability</i>	Smart Array Advanced Pack <i>Maximum control</i>
Number of Drives / Logical Volumes	2 / 2	2 / 2	2 / 2
RAID Type	0, 1	0, 1	0, 1
ACU, ORCA, and Management Agents			
Ability to enable Disk Write Cache			
Transportable Battery Backup for Cache	No	Optional with 256MB; Always with 512MB	Optional with 256MB; Always with 512MB
Volume Addition / Extension	No		
Online Drive Flash	No		
Offline Mirror Splitting & Recombining	No	No	
Drive Erase	No	No	

Smart Array Advanced Pack (SAAP) is not available on Zero Memory Configurations

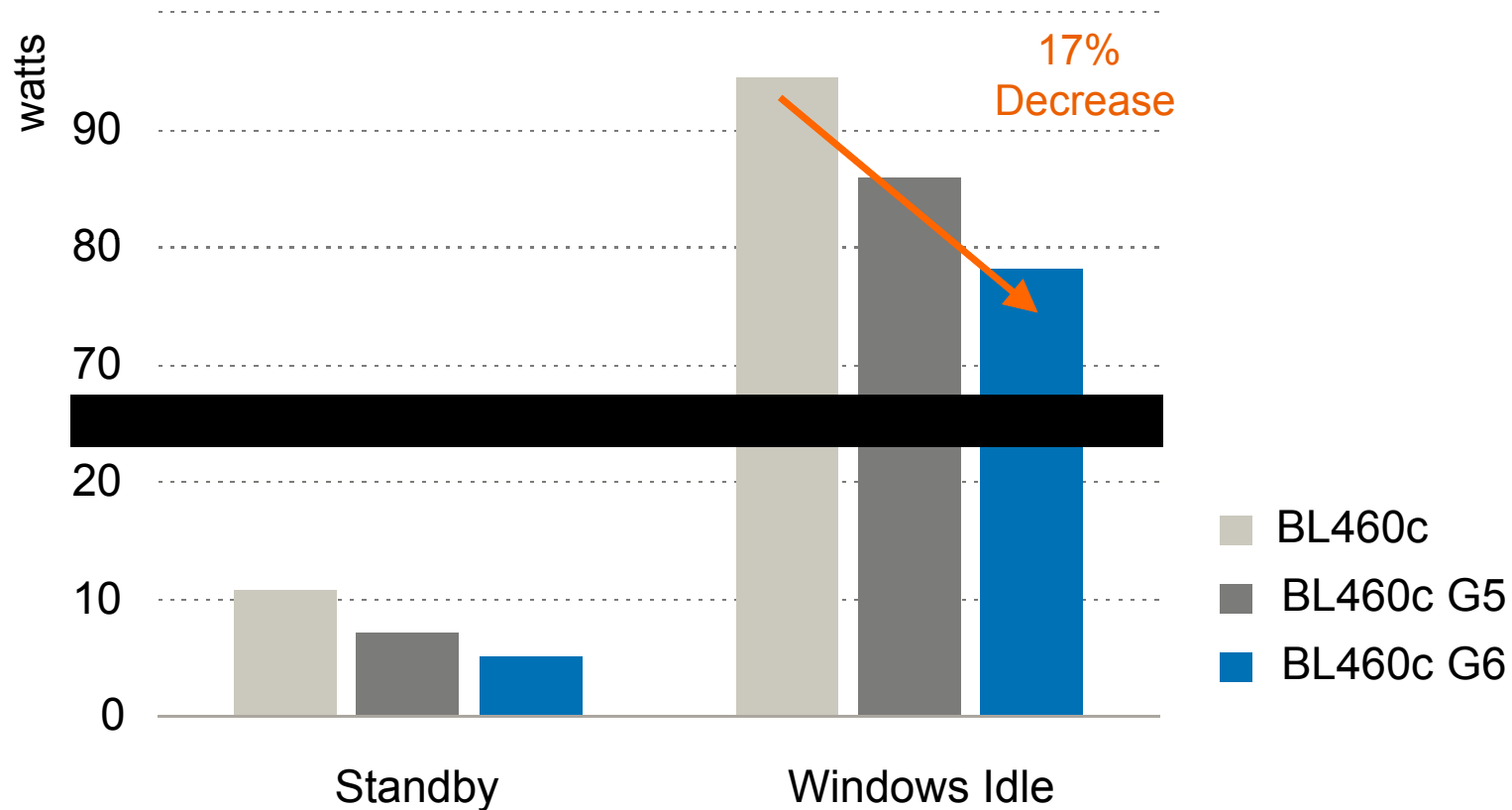


Solid State Drive (SSD)

- Extreme Ruggedness
 - Extended Operating Temperature (0° up to 70°C)
 - Shock and Vibration almost a non-issue
- High Read Performance
 - > 50x SATA random read performance
 - > 15x SAS random read performance
 - No seek time means high IOPS
 - Limited write performance (relative to 15k SAS)
- Increased Reliability
 - No moving parts
- Up to 10x Reduced Power
 - < 2 watts, versus 9 Watt for 15k 2.5” SAS
- Thermal, Size and Acoustic Advantages
 - No Noise, Low Heat
- SSD for the BL490c G6
 - 1.5Gb SATA Interface
 - Non-Hot Plug
 - 32GB and 64GB capacity points
 - Software RAID only
 - Target usage: Boot Drives for site that cannot take advantage of Boot-from-SAN (BfS), or that cannot utilize iHypervisor
 - Same SSD that is used in BL495c G5



HP BL460c G6 power efficiency



BL460c and BL460c G5: 1P Xeon E5450 (3.0GHz, 80W), 2 x 1GB FBDIMM, 1 x 72GB SAS
BL460c G6: 1P Nahalem (2.8GHz, 95W), 2 x 1GB DDR3-1333 UDIMMs, 1 x 72GB SAS
Power measured with Agilent digital multimeter



invent

HP BladeSystem c-Class server positioning

Traditional Rack-Mount



Server Blade