

# HP BladeSystem

Family guide



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## HP BladeSystem: A smarter way to build an infrastructure

For 40 years, infrastructures were built the same way. Lots of boxes, connected with lots of wires, maintained by lots of people.

Universally, whether the infrastructure is large or small, four infrastructure problems emerge:

- **Cost:** High cost to buy, even higher costs to run and maintain
- **Time:** Low productivity, downtime and slow reaction to new opportunities
- **Change:** Inflexible and hard-wired systems with complex processes and multiple people involved
- **Energy:** Inefficient, power-hungry systems that create rising electricity costs and air conditioning bills

The HP BladeSystem addresses these challenges by consolidating everything you need in an IT infrastructure from the start, before it grows out of control.

Your technology infrastructure needs are as unique as your business. We know there is no such thing as a one-size-fits-all solution. That is why HP gives you choices to put blades to work for your business from the desktop to the data center.

We don't believe you should compromise the trusted technologies just to gain the advantages of blades. That is why HP BladeSystem components have the same features as the server, storage and network components you rely on today, only repackaged into a simplified, more cost-effective design.

The biggest difference between blade architectures and those based on traditional servers is how they are built and managed. We make sure you can run the same applications and operating systems you want today and tomorrow—connect with everything in your environment now and never sacrifice on performance, reliability or efficiency.

### One box, full of possibilities

HP BladeSystem is an infrastructure in a box. With it, you can build a variety of business technology solutions that are more affordable, take less time to maintain, use less power and are ready to grow with you. It is simply a better infrastructure to quickly deliver quality services to your business.

With a versatile, all-in-one design, you have what you need to build and maintain your infrastructure from start to finish. Inside, you can choose from thousands of applications on a variety of OSs with a combination of server and storage components and a choice of the most popular networking brands and standards including Ethernet, Fibre Channel, direct connect SAS, and InfiniBand.

We build in the networking to help you decrease the number of cables by up to 94 percent.<sup>1</sup> We add a smarter power and cooling system to help you save more than 47 percent on power compared to traditional rack infrastructures without sacrificing features or performance. And we include an interface and software that help you at every step—so one person can do the job of many, with less effort.

And when you are ready, our worldwide community of business technology experts and partners are here to help you build the ideal solution and support plan that is just right for you. We integrate the infrastructure essentials inside the BladeSystem so that before it ever arrives at your door, we do a lot of the hard work that you would have had to do on your own to deliver the best business results.

These eight easy steps are what you need to consider when building your ideal BladeSystem infrastructure solution.

Step 1: Choose your operating environment.

Step 2: Choose your server blades.

Step 3: Choose your storage infrastructure.

Step 4: Choose your interconnects.

Step 5: Choose your BladeSystem enclosure.

Step 6: Choose your infrastructure management.

Step 7: Choose your power and cooling configurations.

Step 8: Choose your services.

We also provide pre-integrated infrastructure solutions based on the BladeSystem modular architecture. From Integrity NonStop BladeSystem and High Performance Cluster Platforms to HP Workstation and Desktop solutions, HP is applying the power of blades to a variety of application and industry-specific challenges customized to your requirements.

HP offers a complete portfolio to help you build the perfect infrastructure for your business.

<sup>1</sup> Comparing all cable requirements of 16 c-Class server blades versus 16 standard 1U servers

# Step 1: Choose your Operating Environment: OS, Virtualization SW, and Applications

Just like other HP servers, HP Integrity and HP ProLiant server blades run most of the same operating environment, but with the advantages of a BladeSystem infrastructure. You can mix and match different Integrity and ProLiant server blades in the same enclosure and run many different operating environments in one enclosure. HP also offers the HP Integrity NonStop BladeSystem—a fully customized server solution for the ultimate in 24/7 availability and data integrity of transaction-intensive applications.

Operating systems	
HP-UX 11i	Supported on Integrity server blades
HP OpenVMS	Supported on Integrity server blades
NonStop	Only available with Integrity NonStop NB50000c BladeSystem
Microsoft® Windows	Supported on Integrity and ProLiant server blades
Linux	Supported on Integrity and ProLiant server blades
Solaris®	Supported on ProLiant server blades
VMware	Supported on ProLiant server blades
NetWare	Supported on the ProLiant BL460c server blade
Virtualization Software	
Microsoft Hyper-V	Supported on ProLiant server blades
VMware	Supported on ProLiant server blades
Citrix XenServer	Supported on ProLiant server blades

## Applications and virtual machines

The number of applications, virtual machines, and users supported by your solution will determine the number of server blades you need for the next step—where you choose your server blades. HP and our channel partners can help you choose the right number of blades with our solution-sizing tools and expertise. ActiveAnswers is an online resource with a variety of solutions to help you make the right choice. For more information on ActiveAnswers or to find simple solution help, visit:

[www.hp.com/go/activeanswers](http://www.hp.com/go/activeanswers)

To make sure we support the applications you rely on today as well as the new ones you will rely on tomorrow, we created the HP BladeSystem Solution Builder Program. This program brings together a worldwide community of technology and service providers that collaborate with HP and each other to define, deliver, and deploy application solutions as well as create new technology for the HP BladeSystem. To learn more about the BladeSystem Solution Builder Program, visit:

[www.hp.com/go/bladesystem/solutions](http://www.hp.com/go/bladesystem/solutions)

## Find out which of your OS and Virtualization Software are supported

**ProLiant & BladeSystem Servers—Support & Certification:**  
[www.hp.com/go/ossupport](http://www.hp.com/go/ossupport)

**Integrity certification:**

[www.hp.com/go/integrity/windows](http://www.hp.com/go/integrity/windows)

[www.hp.com/go/integrity/linux](http://www.hp.com/go/integrity/linux)

[www.hp.com/go/integrity/hpux](http://www.hp.com/go/integrity/hpux)

[www.hp.com/go/integrity/nonstop](http://www.hp.com/go/integrity/nonstop)

[www.hp.com/go/integrity/openvms](http://www.hp.com/go/integrity/openvms)

## Step 2: Choose your server blades

Build and configure each server blade with the right features to fit your needs, without compromise.

### Server blades



#### HP ProLiant BL2x220c

The world's first double-dense blade is an ideal choice for customers interested in high-performance computing or scale-out server solutions.



#### HP ProLiant BL280c G6

Delivers outstanding dual-processor performance per watt and price per watt to reduce overall data center power consumption while maintaining high performance.



#### HP ProLiant BL460c G6

The world's most popular server blade delivers high performance and reliability in a dense form factor.

<b>Number of processors</b>	1–2	1–2	1–2
<b>Maximum number of cores</b>	16 per BL2x220c Blade	8	8
<b>Processors supported</b>	Dual- and Quad-core Intel® Xeon® processors: up to 3.00 GHz	Dual- and Quad-core Intel® Xeon® processors: up to 2.93 GHz	Dual- and Quad-core Intel® Xeon® processors: up to 2.93 GHz
<b>Cache</b>	Up to 8 MB L2 (2 x 4 MB)	Up to 16 MB L3 (2 x 8 MB)	Up to 16 MB L3 (2 x 8 MB)
<b>Maximum memory (per server node)</b>	16 GB	96 GB	96 GB
<b>Network ports (per server node)</b>	2	2	2
<b>Drives supported (per server node)</b>	Up to 1	Up to 2	Up to 2
<b>Maximum internal storage (per server node)</b>	120 GB	600 GB	600 GB
<b>I/O expansion</b>	1 PCIe mezzanine expansion slots	2 PCIe mezzanine expansion slots	2 PCIe mezzanine expansion slots
<b>Form factor</b>	6U or 10U enclosure	6U or 10U enclosure	6U or 10U enclosure
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	3-year/0/0	3-year/3-year/3-year

### HP related offerings

#### Support services\*

Recommended Installations and Startup for HP BladeSystem Infrastructures plus 3-years, 24x7 hardware support HP Care Packs

#### Storage

For internal enclosure storage, choose the StorageWorks SB40c storage blade or All-in-One SB600c storage blade. External options include the HP StorageWorks MSA2000 MDS 600, Enterprise Virtual Array (EVA), and HP LeftHand P4000 SAN Solutions. Protect your data with Ultrium Tape Blades or externally connected tape libraries and disk backup systems.

#### Software

For Windows and Linux-based blade infrastructure, choose Insight Control suite (ICE).  
 For Linux-only management solutions, choose Insight Control suite for Linux (ICE-LX).  
 For fully virtualized environments across ProLiant blades, choose Insight Dynamics – VSE suite for ProLiant.  
 For fully virtualized environments across Integrity blades, choose HP Virtual Server Environment.  
 For the latest product support, please refer to the product documentation.

\*All blades within a single HP BladeSystem enclosure must be at the same service level.

Server blade options—including memory DIMM, hot-plug drives, solid state drives, and high-capacity SAS and SATA—are available on select models.

For more information, visit: [www.hp.com/go/proliantoptions](http://www.hp.com/go/proliantoptions) or [www.hp.com/go/integrityblades](http://www.hp.com/go/integrityblades)

## Step 2: Choose your server blades

Build and configure each server blade with the right features to fit your needs, without compromise.

For different computing needs, HP now offers more than servers. We also offer workstation and virtual desktop blade solutions.



### Server blades



#### HP ProLiant BL465c G5

This is an ideal choice for customers looking for flexibility, performance, and reliability in an enterprise-class server blade.



#### HP ProLiant BL490c G6

Minimize your cost per virtual machine with the high memory capacity of this virtualization blade.



#### HP ProLiant BL495c G5

Engineered with more memory expansion and I/O than any other two-processor blade server, the BL495c maximizes the number and performance of VMs that you can deploy per blade.



#### HP ProLiant BL680c G5

Ideal for hosting larger databases, applications and many virtual machines, the BL680c G5 delivers no-compromise performance and expansion in the densest 4P server blade form-factor available.

<b>Number of processors</b>	1–2	1–2	1–2	2 or 4
<b>Maximum number of cores</b>	8	8	8	24
<b>Processors supported</b>	Quad-Core AMD Opteron™ processors: up to 2.9 GHz	Quad-Core Intel Xeon processors up to 2.93 GHz	Quad-Core AMD Opteron™ processors: up to 2.9 GHz	Dual-, Quad- and 6-core Intel Xeon processors: up to 2.4 GHz
<b>Cache</b>	512 KB L2 cache per core 2 MB or 6 MB L3 cache	Up to 16 MB L3 (2 x 8 MB)	512 KB L2 cache per core 2 MB or 6 MB L3 cache	Up to 16 MB level 3 cache
<b>Maximum memory</b>	64 GB	144 GB	128 GB	128 GB
<b>Network ports</b>	2	2	2	4
<b>Drives supported</b>	Up to 2	Up to 2	Up to 2	Up to 2
<b>Maximum internal storage</b>	600 GB	128 GB	128 GB of non Hot Plug solid state storage up to an additional 876 GB of Hot Plug SAS Storage with SB40c	600 GB
<b>I/O expansion</b>	2 PCIe mezzanine expansion slots	2 PCIe mezzanine expansion slots	2 PCIe mezzanine expansion slots	3 PCIe mezzanine expansion slots
<b>Form factor</b>	6U or 10U enclosure	6U or 10U enclosure	6U or 10U enclosure	6U or 10U enclosure
<b>Warranty (parts/labor/onsite)</b>	3-year/3-year/3-year	3-year/3-year/3-year	3-year/3-year/3-year	3-year/3-year/3-year

### HP related offerings

#### Support services\*

Recommended Installations and Startup for HP BladeSystem Infrastructures plus 3-years, 24x7 hardware support HP Care Packs.

#### Storage

For internal enclosure storage, choose the StorageWorks SB40c storage blade or All-in-One SB600c storage blade. External options include the HP StorageWorks MSA2000 MDS 600, Enterprise Virtual Array (EVA), and HP LeftHand P4000 SAN Solutions. Protect your data with Ultrium Tape Blades or externally connected tape libraries and disk backup systems.

#### Software

For Windows and Linux-based blade infrastructure, choose Insight Control suite (ICE).  
For Linux-only management solutions, choose Insight Control suite for Linux (ICE-LX).  
For fully virtualized environments across ProLiant blades, choose Insight Dynamics – VSE suite for ProLiant.  
For fully virtualized environments across Integrity blades, choose HP Virtual Server Environment.  
For the latest product support, please refer to the product documentation.

\*All blades within a single HP BladeSystem enclosure must be at the same service level.

Server blade options—including memory DIMM, hot-plug drives, solid state drives, and high-capacity SAS and SATA—are available on select models.

For more information, visit: [www.hp.com/go/proliantoptions](http://www.hp.com/go/proliantoptions) or [www.hp.com/go/integrityblades](http://www.hp.com/go/integrityblades)

## Step 2: Choose your server blades

Build and configure each server blade with the right features to fit your needs, without compromise.

### Server blades



#### HP ProLiant BL685c G6

With a large memory footprint, the BL685c G6 removes the barriers to server virtualization and delivers outstanding performance for compute-intensive database applications.



#### HP Integrity BL860c

Get the reliability, security and virtualization capabilities of Integrity servers and the mission-critical reliability of HP-UX coupled with the economics and efficiency of BladeSystem.



#### HP Integrity BL870c

A solid platform to run business-critical applications is delivered in a bladed infrastructure, providing superior virtualization, high availability, scalability, simplified management and energy efficiency.

<b>Number of processors</b>	2–4	1–2	1–4
<b>Maximum number of cores</b>	16	4	8
<b>Processors supported</b>	Quad-Core AMD Opteron™ processors: up to 2.9 GHz	Intel Itanium processor 9100 series (dual-core)	Intel Itanium processor 9100 series (dual-core)
<b>Cache</b>	512 KB L2 cache per core 6 MB L3 cache	Up to 18 MB L3	Up to 24 MB L3
<b>Maximum memory</b>	256 GB	48 GB	192 GB
<b>Network ports</b>	4	4	4
<b>Drives supported</b>	Up to 2	Up to 2	Up to 4
<b>Maximum internal storage</b>	600 GB	292 GB	584 GB
<b>I/O expansion</b>	3 PCIe mezzanine expansion slots	3 PCIe mezzanine expansion slots	3 PCIe mezzanine expansion slots
<b>Form factor</b>	6U or 10U enclosure	6U or 10U enclosure	6U or 10U enclosure
<b>Warranty (parts/labor/onsite)</b>	3-year/3-year/3-year	3-year/3-year/3-year	3-year/3-year/3-year

### HP related offerings

#### Support services\*

Recommended Installations and Startup for HP BladeSystem Infrastructures plus 3-years, 24x7 hardware support HP Care Packs.

#### Storage

For internal enclosure storage, choose the StorageWorks SB40c storage blade or All-in-One SB600c storage blade. External options include the HP StorageWorks MSA2000 MDS 600, Enterprise Virtual Array (EVA), and HP LeftHand P4000 SAN Solutions. Protect your data with Ultrium Tape Blades or externally connected tape libraries and disk backup systems.

#### Software

For Windows and Linux-based blade infrastructure, choose Insight Control suite (ICE).  
For Linux-only management solutions, choose Insight Control suite for Linux (ICE-LX).  
For fully virtualized environments across ProLiant blades, choose Insight Dynamics – VSE suite for ProLiant.  
For fully virtualized environments across Integrity blades, choose HP Virtualized Server Environment.  
For the latest product support, please refer to the product documentation.

\*All blades within a single HP BladeSystem enclosure must be at the same service level.

Server blade options—including memory DIMM, hot-plug drives, solid state drives, and high-capacity SAS and SATA—are available on select models.

For more information, visit: [www.hp.com/go/proliantoptions](http://www.hp.com/go/proliantoptions) or [www.hp.com/go/integrityblades](http://www.hp.com/go/integrityblades)

## Step 3: Choose your storage infrastructure

Connect to external HP SAN, NAS and backup solutions or put storage solutions inside the same BladeSystem enclosure, side-by-side with your server blades to add storage expansion and data protection quickly, without adding a single cable.

Did you know HP BladeSystem is the most affordable way to connect servers to your Fibre Channel-based SAN? The BladeSystem architecture reduces cables and transceivers and can help you save up to 64 percent<sup>1</sup> compared to traditional rack-mount environments.



For more information on SAN options from HP, visit: [www.hp.com/go/storage](http://www.hp.com/go/storage)

### HP StorageWorks blades

#### HP BladeSystem Storage options: internal



**HP StorageWorks SB40c Storage Blade**  
Direct attached storage for a single server, or internal shared storage using HP LeftHand P4000 Virtual SAN Appliance software.



**HP StorageWorks SB600c All-in-One**  
Supports the storage needs of all ProLiant server blades in the enclosure, and blends file serving, shared storage array and data protection functions with simple management.



**HP StorageWorks SB460c SAN Gateway Server**  
NAS/SAN gateway to external FC storage using iSCSI or FC connectivity.

<b>Interconnect</b>	Direct attach over PCIe	Ethernet/iSCSI, supports SMB/CIFS, NFS, NCP, AppleTalk, HTTP, FTP protocols	iSCSI, FC
<b>Hard disk drives supported</b>	Up to 6 SFF SAS or SATA drives 36/72/146 GB 10K, SFF SAS 36/72 GB 15K SFF SAS 60/120/250 GB SFF SATA	Up to eight SFF drives, two drive slots in server are populated with 146 GB 10K SFF SAS drives, storage expansion can be up to six 146 GB 10K SFF SAS drives or up to six 250 GB 5.4K SFF SATA drives	2 x 72 GB 10K SFF SAS drives
<b>Maximum capacity</b>	Up to 876 GB SAS Up to 1.5 TB SATA	Up to 1.16 TB SAS Up to 1.5 TB SATA	Gateway to unlimited external storage
<b>Form factor</b>	Half-height storage blade	Half-height storage blade, requires two adjacent BladeSystem slots	Half-height server blades
<b>RAID levels supported</b>	0, 1, 0+1, 5, 6	0, 1, 1+0, 5, 6	OS configured with RAID 1
<b>Warranty (parts/labor/onsite)</b>	3-year/3-year/3-year	Hardware—3-year/3-year/3-year Software—1-year, 9 x 5 NBD	Hardware—3-year/3-year/3-year Software—1-year, 9 x 5 NBD

#### HP related offerings

<b>Support services</b>	Recommended Installations and Startup for HP BladeSystem Infrastructures plus 3-years, 24x7 Hardware Support HP Care Packs	Recommended-Support Plus 24 HP Care Pack Enhanced-Proactive 24 HP Care Pack	Recommended-Support Plus 24 HP Care Pack Enhanced-Proactive 24 HP Care Pack
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#### HP BladeSystem Tape Backup options: internal



**HP StorageWorks SB920c Tape Blade**  
Integrated data protection for your blade enclosure.



**HP StorageWorks SB1760c Tape Blade**  
Integrated data protection for your blade enclosure.

<b>Interconnect</b>	3 Gb/sec SAS	3 Gb/sec SAS
<b>Capacity</b>	400 GB (2:1 compression)	1.6 TB (2:1 compression)
<b>Transfer rate</b>	Up to 172.8 GB per hour at 2:1 compression	Up to 576 GB per hour at 2:1 compression
<b>Format</b>	LTO-2 Ultrium	LTO-4 Ultrium
<b>Media compatibility</b>	LTO-2 Ultrium (read and write) LTO-1 Ultrium (read and write)	LTO-4 Ultrium (read and write) LTO-3 Ultrium (read and write) LTO-2 Ultrium (read only)
<b>Form factor</b>	Half-height storage blade	Half-height storage blade
<b>Warranty</b>	3-year, next-day, parts exchange	3-year, next-day, parts exchange

#### HP related offerings

<b>Support services</b>	Recommended 3-years support HP Care Pack	Recommended 3-years 24x7 hardware support HP Care Pack
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<sup>1</sup> Comparing all HBA, transceiver, cable and switch requirements of 16 cClass server blades versus 16 standard 1U servers.

# Step 3: Choose your storage infrastructure

## HP StorageWorks blades

### HP BladeSystem Storage options: external



HP StorageWorks All-in-One Storage System family

HP StorageWorks MDS600

HP StorageWorks MSA2000 family

HP LeftHand P4000 SAN

HP StorageWorks EVA family

	HP StorageWorks All-in-One Storage System family	HP StorageWorks MDS600	HP StorageWorks MSA2000 family	HP LeftHand P4000 SAN	HP StorageWorks EVA family
<b>Interconnect</b>	Ethernet/iSCSI, supports SMB/CIFS, NFS, NCP, AppleTalk, HTTP, FTP protocols	Direct connect SAS	Ethernet and Fibre Channel, and direct connect SAS	1 Gb iSCSI with option for 10 Gb	Ethernet/iSCSI and Fibre Channel
<b>Hard disk drives supported</b>	SFF or LFF, SAS or SATA depending on model	Up to 70 LFF SAS or SATA drives	Up to 60 LFF SAS or SATA drives Up to 99 SFF SAS or SATA drives	Up to 720 LFF SATA or SAS drives depending on model	LFF FC, FATA and Solid State Up to 324 drives
<b>Maximum capacity</b>	Up to 12 TB depending on model	Up to six MDS600 devices supported off a single BladeSystem enclosure	60 TB with LFF SATA drives or 29.7 TB with SFF SAS drives	360 TB Max depending on model. Capacity and performance scale as additional nodes are added	Up to 324 TB
<b>RAID levels supported</b>	0, 1, 0+1, 5, 6	RAID functionality provided by P700m Smart Array controller installed in each server	0, 1, 3, 5, 10, 50	Hardware RAID (10, 5, 6). Network RAID for storage clustering against system or site failure	Vraid0, Vraid1, Vraid 0+1, Vraid5, Vraid 0+5, Vraid 6, and Cross Vraid Snaps
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	3-year, next-day, parts exchange	3-year, next-day, parts exchange	3-year/3-year/3-year	3-year/3-year/3-year (2-year/2-year/2-year for starter kits)

## HP related offerings

	HP StorageWorks All-in-One Storage System family	HP StorageWorks MDS600	HP StorageWorks MSA2000 family	HP LeftHand P4000 SAN	HP StorageWorks EVA family
<b>Support services</b>	Recommended 3-years Support Plus 24 HP Care Pack, Enhanced 3-years Proactive 24 HP Care Pack Service	3-year, Support Plus 24 3-year, Proactive 24 Service	Recommended HP StorageWorks MSA Family Disk Array, Installation and Startup plus 3-year, Support Plus 24 HP Care Packs	Installation and Startup service 3-year Support Plus 24	Recommended 3-years Support Plus 24 HP Care pack, Enhanced 3-years Proactive 24 HP Care Pack Service

## Solid State Storage Mezzanines



### HP StorageWorks IO Accelerator for HP BladeSystem c-Class

Ideal for organizations faced with increasing demands for better application performance from their technology infrastructure.

<b>Capacity (Native)</b>	320 GB
<b>Servers supported</b>	BL460c G1, 460c G5, 465c G5, 480c G1, 680c G5, 685c G5, 260c G5, 2x220c G5, BL495c
<b>Maximum IOPS</b>	100,000 IO/sec
<b>Supported operating systems</b>	RHEL 4, 5SLES 9, 10 Windows x86, x86-64 2003, 2008
<b>Warranty (parts-labor-onsite)</b>	3-year/0/0

## Step 4: Choose your interconnects

Reduce your Ethernet, Fibre Channel or InfiniBand cables, switch ports, and other network equipment by up to 94 percent<sup>1</sup> by using fewer cables between your server and the network.

### Interconnects

#### Virtual Connect modules



HP Virtual Connect Flex-10 10Gb Ethernet Module

HP 1/10 Gb-F Virtual Connect Ethernet Module

	HP Virtual Connect Flex-10 10Gb Ethernet Module	HP 1/10 Gb-F Virtual Connect Ethernet Module
<b>Blade type</b>	Single bay	Single bay
<b>Network Connections</b>	16 x 10 Gb downlinks midplane 2 x 10 Gb cross connect 1 x 10 Gb copper uplinks CX-4 8 x 10 Gb SR, LR, or LRM fiber uplinks SFP+ 1 management USB port 1 internal interface to c-Class Onboard Administrator Module	16 x 1 Gb downlinks midplane 1 x 10 Gb cross connect 1 x 10 Gb copper uplinks CX-4 2 x 10 Gb SR or LR fiber uplinks XFP 2 x 1 Gb SX or RJ-45 fiber uplinks SFP 4 x 1 Gb 1000/100/10 Gb copper uplinks RJ-45 1 management USB port 1 internal interface to c-Class Onboard Administrator Module
<b>Media types</b>	SFP+ SR, LR, LRM, SFP SX, RJ-45 SFP + Copper, Twinax CX-4 (IB4x)	SFP SX, RJ-45, FX SR and LR Copper RJ-45 100 Ohm 2-pair, Cat5 UTP, Twinax CX-4 (IB4x)
<b>Performance</b>	Line Rate, full-duplex 240 Gbps bridging fabric Less than 1ms latency	Line Rate, full-duplex 62 Gbps bridging fabric Less than 4ms latency
<b>Protocol Support</b>	802.1AB, 802.1D, 802.1Q, IEEE 802.2, 802.3ad	802.1AB, 802.1D, 802.1Q, IEEE 802.2, 802.3ad
<b>Management</b>	Simple and intuitive Graphical User Interface and Setup Wizards Embedded SNMP v1, v2, Command Line Interface, Port Mirroring—Any uplink port can be used as a dedicated mirrored port from the server port(s)	Simple and intuitive Graphical User Interface and Setup Wizards Embedded SNMP v1, v2, Command Line Interface, Port Mirroring—Any uplink port can be used as a dedicated mirrored port from the server port(s)
<b>Extended Management Features</b>	Virtual Connect Enterprise Manager (VCEM) Support, Supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass through, IGMP Snooping, NIC Teaming, Integrated with Onboard Administrator HP Systems Insight Manager, Telnet, SNM	Virtual Connect Enterprise Manager (VCEM) Support, Supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass through, IGMP Snooping, NIC Teaming, Integrated with Onboard Administrator HP Systems Insight Manager, Telnet, SNM
<b>High Availability Features</b>	Link Aggregation Protocol, Automatic loop avoidance, Mirrored profile database Multi-path heartbeat between redundant modules	Link Aggregation Protocol, Automatic loop avoidance, Mirrored profile database, Multi-path heartbeat between redundant modules
<b>Security</b>	LDAP, SSL, Role-based management	LDAP, SSL, Role-based management
<b>Maximum per enclosure</b>	8	8
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	1-year/1-year/1-year

### HP related offerings

#### Support services\*

Recommended Enhanced Network Installation and Startup service for HP BladeSystem switches.

#### Software

Virtual Connect Enterprise Manager to centrally manage multiple BladeSystem enclosures.

#### External storage

iSCSI storage via MSA2000i.

\*All blades within a single HP BladeSystem enclosure must be at the same service level.

<sup>1</sup> Comparing all cable requirements of 16 c-Class server blades versus 16 standard 1U servers.

# Step 4: Choose your interconnects

## Interconnects (continued)

### Virtual Connect modules



HP 1/10 Gb Virtual Connect Ethernet Module



HP Virtual Connect 4Gb Fibre Channel Module

	HP 1/10 Gb Virtual Connect Ethernet Module	HP Virtual Connect 4Gb Fibre Channel Module
<b>Blade type</b>	Single bay	Single bay
<b>Network Connections</b>	16 x 1 Gb downlinks midplane 1 x 10 Gb cross connect 2 x 10 Gb copper uplinks CX-4 8 x 1 Gb 1000/100/10 Gb copper uplinks RJ-45 1 management USB port 1 internal interface to c-Class Onboard Administrator Module	16 internal 4 Gb downlinks presented as F-Ports 4 external 4 Gb uplinks presented as N-Ports
<b>Media types</b>	Copper RJ-45 100 Ohm 2-pair, Cat5 UTP or equivalent, Twinax CX-4 (IB4x)	Small form-factor pluggable (SFP) laser, 1/2/4 Gb short wave up to 500 m (1,640 ft), 1/2/4 Gb long wave up to 10 km
<b>Performance</b>	Line Rate, full-duplex 54 Gbps bridging fabric, Less than 4ms latency	4 Gbps line speed, full duplex 1.2 μ sec latency, Maximum frame size 2112-byte payload Buffer-to-buffer flow control management packet prioritization
<b>Protocol Support</b>	NCITS T11 N_Port ID Virtualization (NPIV)	NCITS T11 N_Port ID Virtualization (NPIV)
<b>Management</b>	Simple and intuitive Graphical User Interface and Setup Wizards Embedded SNMP v1, v2, Command Line Interface, Port Mirroring—Any uplink port can be used as a dedicated mirrored port from the server port(s)	Simple and intuitive Graphical User Interface and Setup Wizards accessible through VC, Ethernet module, Command Line Interface accessible through VC Ethernet module, Embedded SNMP v1 and v2SMI-S
<b>Extended Management Features</b>	Virtual Connect Enterprise Manager (VCEM) Support, Supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass through, IGMP Snooping, NIC Teaming, Integrated with Onboard Administrator HP Systems Insight Manager, Telnet, SNM	Virtual Connect Enterprise Manager (VCEM) Support, HP Storage Essentials (FC Management MIB)
<b>High Availability Features</b>	Link Aggregation Protocol, Automatic loop protection, Mirrored profile database, Multi-path heartbeat between redundant modules	Link Aggregation Protocol, Automatic loop protection, Mirrored profile database, Multi-path heartbeat between redundant modules
<b>Security</b>	LDAP, SSL, Role-based management	LDAP, SSL, Role-based management
<b>Maximum per enclosure</b>	8	6
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	1-year/1-year/1-year

### HP related offerings

#### Support services\*

Recommended Enhanced Network Installation and Startup service for HP BladeSystem switches

#### Software

Virtual Connect Enterprise Manager to centrally manage multiple BladeSystem enclosures.

#### External storage

iSCSI storage via MSA2000i

MSA2000fc, EVA, XP

\*All blades within a single HP BladeSystem enclosure must be at the same service level.

# Step 4: Choose your interconnects

## Interconnects

### Ethernet switches



**Cisco Catalyst Blade Switch 3020 for HP c-Class BladeSystem**

**Cisco Catalyst Blade Switch 3120G/3120X**

**HP GbE2c Layer 2/3 Ethernet Blade Switch**

	Cisco Catalyst Blade Switch 3020 for HP c-Class BladeSystem	Cisco Catalyst Blade Switch 3120G/3120X	HP GbE2c Layer 2/3 Ethernet Blade Switch
<b>Performance</b>	48 Gb switching fabric 128 Mb DDR SDRAM 32 Mb Flash memory	80 Gb switching fabric 256 Mb SDRAM 64 Mb Flash memory	48 Gb switching fabric 128 Mb SDRAM 16 Mb Flash memory
<b>Port configuration</b>	16 internal 10 Gb downlinks 8 external 10/100/1000 SFP/BASE-T uplinks (2 configurable as cross-connects) 1 management console port	16 internal 10 Gb downlinks 4 external 10/100/1000/ BASE-T uplinks 2 internal cross connects 4 optional external 10/100/1000 SFP uplinks 2 external 10 Gb X2 uplinks (3120X only)	16 internal 10 Gb downlinks 5 external 10/100/1000BASE-T uplinks 2 internal cross-connects 1 management console port
<b>Management features</b>	CiscoWorks, SNMP v1, v2, v3, Telnet, CLI	CiscoWorks SNMP v1, v2, v3, Telnet CLI,	Dual-mode CLI - AOS and iSCLI, SNMP v1, v2, v3, HTTP, HTTPS, NTP server support, RMON
<b>High-availability features</b>	Per VLAN Spanning Tree Plus Uplink Fast Port Fast Bridge Protocol Data Unit	Per VLAN Spanning Tree Plus Uplink Fast Port Fast Bridge Protocol Data Unit	Link Aggregation Protocol Uplink failure detection Spanning Tree Virtual Router Redundancy Protocol (VRRP)
<b>Protocols supported</b>	SSH v2, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1d, 802.1p, 802.1q, 802.3, 802.3u, 802.3ab, 802.3z	SSH v2, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1d, 802.1p, 802.1q, 802.3, 802.3u, 802.3ab, 802.3z	SSH v2, TACACS, TACACS+, RADIUS, 802.3, 802.3u, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.3ac, 802.1x
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year 3-year software updates	1-year/1-year/1-year 3-year software updates	1-year/1-year/1-year

### HP related offerings

#### Support services

Support for this product included with HP BladeSystem Enclosure Service

#### Options

1000Base SX Fibre SFP Module

IP Services Software upgrade license for Cisco 3120 Series, Advanced IP Services Software upgrade license for Cisco 3120 Series, 1000 Base SX Fibre SFP Module, 10 Gb CX4 X2 Module (3120X), 10 Gb SR X2 Module (3120X), 10 Gb LRM X2 Module (3120X), 0.5, 1.0 and 3.0 meter stacking cables

Fibre SFP module kit (maximum 2 per switch), Premium Software Subscription service

#### External storage

iSCSI storage via MSA2000i

# Step 4: Choose your interconnects

## Interconnects (continued)

### Ethernet switches



**HP 1:10Gb Ethernet BL-c Switch**



**HP 10Gb Ethernet BL-c Switch**

	HP 1:10Gb Ethernet BL-c Switch	HP 10Gb Ethernet BL-c Switch
<b>Performance</b>	120 Gb switching fabric 256 Mb SDRAM 64 Mb Flash memory	400 Gb switching fabric 256 Mb SDRAM 64 Mb Flash memory
<b>Port configuration</b>	16 internal 10 Gb downlinks 4 external 10/100/1000BASE-T uplinks 1 external 10 Gb CX4 uplink 2 external 10 Gb XFP ports 1 internal 10 Gb cross-connect 1 management console port	16 internal 10 Gb downlinks 4 external 10 Gb XFP ports 1 management console port
<b>Management features</b>	Dual-mode CLI—AOS and iSCLI, SNMP v1, v2, v3, HTTP, HTTPS, NTP server support, RMON	Dual-mode CLI—AOS and iSCLI, SNMP v1, v2, v3, HTTP, HTTPS, NTP server support, RMON
<b>High-availability features</b>	Link Aggregation Protocol Uplink failure detection Spanning Tree Virtual Router Redundancy Protocol (VRRP)	Link Aggregation Protocol Uplink failure detection Spanning Tree Virtual Router Redundancy Protocol (VRRP)
<b>Protocols supported</b>	SSH v2, TACACS, TACACS+, RADIUS, 802.3, 802.3u, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.3ac, 802.1x	SSH v2, TACACS, TACACS+, RADIUS, 802.3, 802.3u, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.3ac, 802.1x
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	1-year/1-year/1-year

### HP related offerings

#### Support services

Support for this product included with HP BladeSystem Enclosure Service

#### Options

XFP modules, Premium Software Subscription service

#### External Storage

iSCSI storage via MSA2000i

# Step 4: Choose your interconnects

## Interconnects

### Fibre Channel switches



**Brocade 8Gb SAN Switch for HP BladeSystem c-Class**



**Cisco MDS 9124e Fabric Switch for HP c-Class BladeSystem**

<b>Performance</b>	8 Gbps, non-blocking and auto-sensing 2/4/8 Gb	4 Gbps, non-blocking and auto-sensing 1/2/4 Gb
<b>Port configuration</b>	384 Gbps (end-to-end)	192 Gbps (end-to-end)
<b>Management features</b>	Web Tools; Advanced Zoning; Power Pack+ (bundled or optional); Adaptive Networking, ISL Trunking, Advanced Performance Monitoring, Fabric Watch, Extended Fabrics; Fabric Manager (optional)	Cisco MDS 9000 Family Command Line Interface (CLI), Cisco Fabric Manager, Cisco Fabric Manager Server (optional), Cisco Enterprise Package (optional)
<b>High-availability features</b>	Redundant switches; hot pluggable; non-disruptive software upgrades	Redundant switches; hot pluggable; non-disruptive software upgrades
<b>Protocols supported</b>	Fibre Channel	Fibre Channel
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	1-year/1-year/1-year

### HP related offerings

#### Support services

Recommended 3-years, 24x7 hardware support HP Care Pack

Recommended 3-years, 24x7 hardware support HP Care Pack

#### Options

SFP+ (short wave)  
SFPs (short wave, long wave)

SFPs (short range, medium range, long range)

#### External Storage

HP MSA2000, EVA, and XP disk arrays

HP MSA2000, EVA, and XP disk arrays

# Step 4: Choose your interconnects

## Interconnects (continued)

### Fibre Channel HBA mezzanine cards



**Emulex LPe1105-HP 4Gb FC HBA for HP c-Class BladeSystem**

**HP QLogic QMH2462 4Gb FC HBA for HP c-Class BladeSystem**

<b>Performance</b>	115,000 IOPS per port	150,000 IOPS per port
<b>Port configuration</b>	Dual 4 Gb Fibre Channel ports	Dual 4 Gb Fibre Channel ports
<b>Management features</b>	Emulex installation and management tools automate installation and provide local and remote HBA configuration and management	QLogic SANsurfer FC HBA Manager for centralized management and remote control of distributed HBAs
<b>High-availability features</b>	Multi-path support for redundant HBAs and paths	Multi-path support for redundant HBAs and paths
<b>Protocols supported</b>	Full support for both FC service Class 2 and 3	Full support for both FC service Class 2 and 3
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	1-year/1-year/1-year

### Ethernet network adapter mezzanines



**NC325m Quad-Port 1 GbE Adapter**

**NC326m Dual-Port 1 GbE Adapter**

**NC360m Dual-Port 1 GbE Adapter**

**NC326m Quad-Port 1 GbE Adapter**

<b>Hardware features</b>				
<b>IEEE compliance</b>	802.1p, 802.1Q, 802.3, 802.3ad	802.1p, 802.1Q, 802.3, 802.3ad	802.1p, 802.1Q, 802.3, 802.3ad	802.1p, 802.1Q, 802.3, 802.3ad
<b>Ports and transfer rate</b>	4 @ 2,000 Mbps	2 @ 2,000 Mbps	2 @ 2,000 Mbps	4 @ 2,000 Mbps
<b>Form factor</b>	x4 PCIe, type I card	x4 PCIe, type I card	x4 PCIe, type I card	x4 PCIe, type I card
<b>Network controller</b>	Dual Broadcom 5715S	Broadcom 5715S	Intel 82571EB	Dual Intel 82571EB
<b>Software features</b>				
<b>PXE</b>	•	•		
<b>TOE, accelerated iSCSI and iSCSI boot</b>				
<b>Adapter teaming</b>	•	•	•	•
<b>Warranty* (parts/labor/onsite)</b>	1-year/0/0*	1-year/0/0*	1-year/0/0*	1-year/0/0*

\*Or the warranty of the server that holds the adapter, whichever is greater.

## Step 4: Choose your interconnects

### Ethernet network adapter mezzanines (continued)



**NC382m Dual-Port Multifunction GbE Adapter**

**NC532m Dual-Port Flex-10 10 GbE Multifunction CL-c Adapter**

**NC512m Dual-Port Multifunction 10 GbE Ethernet Adapter**

**QLogic QMH4062 1GbE iSCSI Adapter**

#### Hardware features

	NC382m Dual-Port Multifunction GbE Adapter	NC532m Dual-Port Flex-10 10 GbE Multifunction CL-c Adapter	NC512m Dual-Port Multifunction 10 GbE Ethernet Adapter	QLogic QMH4062 1GbE iSCSI Adapter
<b>IEEE compliance</b>	802.1p, 802.1Q, 802.3, 802.3ad	802.3u, 802.3x, 802.3ad, 802.1p, 802.1q, 802.3z, 802.3ap, 802.3ae	802.1p, 802.3, 802.3ad, 802.3x	802.1p (QoS), 802.1Q (VLANs) (Linux only), 802.3 (Ethernet), 802.3ad Link aggregation (Linux only), and 802.3x (Flow control)
<b>Ports and transfer rate</b>	2 @ 2,000 Mbps	2 @ 10,000 Mbps	2 @ 10,000 Mbps	2 @ 20,000 Mbps
<b>Form factor</b>	x4 PCIe, type I card	x8 PCIe 2.0 type 1 card	x8 PCIe, type II card	x4 PCIe type I card
<b>Network controller</b>	Dual Broadcom 5709S	Broadcom 57711	NetXen NX2031	QMH 4062

#### Software features

<b>PXE</b>	•	•	Accelerated iSCSI (Linux)	TOE, Accelerated iSCSI and iSCSI boot (Windows, Linux, and VMware ESX)
<b>TOE, accelerated iSCSI and iSCSI boot</b>	• TOE (Windows), Accelerated iSCSI and iSCSI boot (Windows and Linux)	• TOE (Windows), Accelerated iSCSI and iSCSI boot (Windows and Linux)	Accelerated iSCSI (Linux)	TOE, Accelerated iSCSI and iSCSI boot (Windows, Linux, and VMware ESX)
<b>Adapter teaming</b>	•	•		
<b>Warranty* (parts/labor/onsite)</b>	1-year/0/0*	1-year/0/0*	1-year/0/0*	1-year/0/0*

### InfiniBand mezzanine HCA and switch module



**HP 4X DDR IB Mezzanine HCAs**

**HP 4X DDR IB Switch Module**

<b>Performance</b>	4X double data rate (20 Gbps)	4X DDR non-blocking switch
<b>Port configuration</b>	Choice of dual-port or single-port card	16 internal 4X DDR downlinks, 8 external 4X DDR uplinks, 1 management console port
<b>Management features</b>	Choice of Cisco IB drivers or Voltaire GridStack IB stack	Externally managed with a choice of Cisco High-Performance Subnet Manager or Voltaire GridVision Fabric Manager
<b>Protocols supported</b>	HP-MPI, iPoIB, and other ULPs	IBTA
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	1-year/1-year/1-year

\* Or the warranty of the server that holds the adapter, whichever is greater

## Step 4: Choose your interconnects

HP direct connect storage extends BladeSystem storage options by directly connecting the BladeSystem chassis to external shared storage.

The 3Gb SAS Switch is a double wide interconnect module that enables each server blade with a Smart Array P700m controller card to communicate with the HP StorageWorks MSA2000sa. And the HP Smart Array P700m controller is one of the highest performing controllers in the SAS portfolio, providing new levels of reliability for HP blade servers

### Interconnects (continued)

#### Direct connect SAS controller and switch



HP StorageWorks 3Gb SAS BL Switch



HP Smart Array P700m Controller

	HP StorageWorks 3Gb SAS BL Switch	HP Smart Array P700m Controller
<b>Performance</b>	3 Gbps	3 Gbps and 512MB BBWC
<b>Port Configuration</b>	Eight 3 Gbps SAS ports	4 x2 SAS port connections through the Blade mezzanine connector
<b>Management Features</b>	Target based management for blade storage. Virtual SAS Manager	Smart Array management with online array expansion, RAID migration, and online spares
<b>Availability Features</b>	Redundant switches for high availability and path failover	Battery backed write cache, RAID (including RAID 6 with ADG, RAID migration Recovery ROM
<b>Warranty (parts/labor/onsite)</b>	1-year/1-year/1-year	3-year, next-day, parts exchange

### HP related offerings

#### Capacity for blade servers

**Shared SAS storage:** Each BladeSystem enclosure supports up to four MSA2000sa storage arrays configured with 3 additional drive enclosures, for up to 192 LFF SAS or SATA drives.

**Zoned SAS storage:** Each BladeSystem enclosure supports up to size MDS600 storage devices, for up to 420 LFF SAS or SATA drives.

#### Data protection

HP StorageWorks 1/8 G2 Autoloader and MSL Tape Libraries with SAS tape drives connect to the direct connect SAS switch to protect data on your blade servers

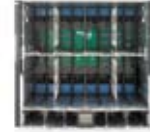
**Note:** With a SAS Mezzanine card and the new 3Gb BL SAS Switch you can connect external disk and tape solutions with a simple cable connection.

## Step 5: Choose your BladeSystem enclosure

Now that you have a good idea of the number of server and storage blades and interconnect modules you may need, it's time to choose the right enclosure for the size of your solution and your environment.

HP BladeSystem enclosures come in two sizes and share the same server, storage and networking components.

### BladeSystem enclosure



#### HP BladeSystem c3000 enclosure

This smaller, versatile design is ideal for small sites like business offices or branch locations that only need up to eight server or storage components at a time. It is ideal because it plugs right into the wall, uses standard power and does not need special air conditioning. It also includes many useful features to help a small staff be more productive with less effort.

#### HP BladeSystem c7000 enclosure

A larger, modular block of infrastructure is ideal for bigger data centers. It holds up to 16 different types of server and storage blades with twice as many interconnect expansion slots available to run nearly any application in a dynamic, high-performance IT environment.

<b>Device bays</b>	Up to 8 server and storage blades, mixed configurations supported	Up to 16 server and storage blades, mixed configurations supported
<b>Interconnect bays</b>	4	8 (up to 4 redundant I/O fabrics)
<b>Power supplies</b>	Up to 6 x 1,200 W	Up to 6 x 2,250 W
<b>Fans</b>	Up to 6 hot plug Active Cool fans	Up to 10 hot plug Active Cool fans
<b>Onboard administrator</b>	Up to 2	Up to 2
<b>Height</b>	6U rack model or tower model	10U
<b>Warranty (parts/labor/onsite)</b>	3-year/3-year/3-year	3-year/3-year/3-year

### HP related offerings

#### Support services

Recommended 3-years, Support Plus 24 and Proactive Select HP Care Packs

#### Options

10000 G2 Series rack, Active Cool 100 fans, c3000 Power Supplies

10000 G2 Series rack, Active Cool 200 fans, c7000 Power supplies

#### HP BladeSystem devices supported

All ProLiant, Integrity, and NonStop Blade servers  
All c-Class Interconnect modules  
All c-Class Storage Blades  
All HP StorageWorks MSA and EVA storage products

For a complete list of supported options, please visit: [www.hp.com/go/productbulletin](http://www.hp.com/go/productbulletin)

Each BladeSystem enclosure includes the Onboard Administrator to set up and maintain, your end-to-end infrastructure, plus the NonStop mid-plane to keep everything inside up and running at top performance. Both share the same useful innovations like Thermal Logic technology to save on power and cooling, your choice of Insight Software to manage it all, and Virtual Connect architecture to add, replace, and recover servers on the fly with fewer cables and hassles.

Best of all, you can mix and match servers, storage and network modules between both enclosures to fit your needs and upgrade easily as you grow.

#### Unlock the potential of your infrastructure by managing all components through one console

Get more from every hour, watt, and dollar you invest in your infrastructure—physical and virtual. HP Insight software provides the most efficient, in-depth way to understand, manage, and potentially control your infrastructure—in real-time and over time. HP Insight software works hand-in-hand with HP platforms to give you:

- **Deep insight** to make more informed decisions
- **Precise control** to accomplish more in less time
- **Ongoing optimization** to deliver better services to your business

# Step 6: Choose your infrastructure management software

Unlock your infrastructure's potential by managing all components through one console.

## HP Insight software suites

		HP Insight Control suite for Linux	HP Insight Control suite	HP Insight Dynamics – VSE suite for ProLiant	HP Virtual Server Environment suite for Integrity
Advanced Infra Mgmt	Recover servers			○	○
	Design and provision infrastructure			○	
	Balance resources			✓	✓
	Plan capacity and power			✓	✓
Essential Infra Mgmt	Deploy servers	✓	✓	✓	○
	Optimize power	✓	✓	✓	○
	Control from anywhere	✓	✓	✓	○
	Manage health and performance proactively	✓	✓	✓	✓
	Virtual machines	○	○	○	✓

✓ = part of suite    ○ = optional

HP Insight Control, an integrated management toolset, provides essential infrastructure management to save you time and money, while giving you the ability to maximize infrastructure ROI. You can deploy servers quickly, manage system health and performance proactively, improve power consumption, control servers from anywhere, and manage virtual machines and scan for vulnerabilities and update patches.

Building on Insight Control suite, HP Insight Dynamics – VSE suite for ProLiant provides advanced infrastructure management to analyze and optimize physical and virtual environments in the same way. With Insight Dynamics – VSE suite for ProLiant, you can plan capacity and power continuously, provision infrastructure consistently, facilitate cost-effective availability, and balance physical and virtual resources.

What's more, your Insight software can be integrated to work with other enterprise management tools. For a broader view of your total environment, Insight Control integrates with HP Software and Microsoft System Center, as well as other enterprise-wide tools.

In addition, each HP BladeSystem enclosure comes with the HP Onboard Administrator module and a handy LCD screen to help you set up, troubleshoot, and maintain your hardware infrastructure with less effort. With it, you can set up, in 15 minutes or less, up to 64 server blades. The intelligence built in keeps track of where resources are in the enclosure, maintains detailed tabs on power and cooling, and monitors the performance of your server, storage, and network. Moreover, it provides one link to remotely access all servers in the enclosure with the Integrated Lights-Out (iLO 2) controllers built into each server blade. (If you choose Integrity servers, you may need to purchase additional management software.)

For more details on software for HP ProLiant and Integrity blades, visit:

- [www.hp.com/go/insight](http://www.hp.com/go/insight)
- [www.hp.com/go/insightcontrol](http://www.hp.com/go/insightcontrol)
- [www.hp.com/go/insightdynamics](http://www.hp.com/go/insightdynamics)
- [www.hp.com/go/vse](http://www.hp.com/go/vse)

## Step 7: Choose your power and cooling configurations

Save power every second with power configurations and redundancy levels to suit your needs. HP Thermal Logic technology makes it a reality.

### HP Thermal Logic capabilities

<b>Active Cool fans</b>	Both high airflow and high pressure are delivered in a small size that can scale to meet future cooling needs. This technology provides the ability to optimize airflow, reduce power draw, and improve acoustic performance for any server blade configuration.
<b>Parallel redundant scalable enclosure cooling (PARSEC) design</b>	A hybrid model for cooling combines the best of local and centralized cooling in a single system to offer more effective airflow and cooling for all servers. Server blades get more cooling airflow where it is needed most and use less power than traditional rack servers.
<b>Instant thermal monitoring</b>	A real-time view of heat, power, and cooling data is provided. If the enclosure's thermal load increases, the Onboard Administrator's Thermal Logic feature instructs the fan controllers to increase fan speeds to accommodate the additional demand. Even better, it works in reverse, using all the features of Thermal Logic to keep fan and system power at the lowest level possible. Onboard Administrator monitors the thermal conditions on the hardware in real time, without a delay for a polling cycle.
<b>Power pooled for true N+N power redundancy</b>	All the power in the enclosure is provided as a single pool that any blade can access, providing increased flexibility when configuring the power in the system so that customers can choose what level of redundancy with which to operate. Because this power design has no zones, it facilitates both N+N and N+1 power modes, which future-proofs the enclosure for higher power requirements, if needed.
<b>Dynamic power saver mode</b>	Power load shifting is provided for improved efficiency and reliability. It improves power supply efficiency to provide real customer power savings and, therefore, money savings. When enabled through Onboard Administrator, the total enclosure power consumption is monitored in real time and automatically adjusted with changes in demand.
<b>Power regulator</b>	The power regulator provides Integrated Lights-Out-controlled speed stepping for Intel x86, AMD x86 and Itanium 9100 series processors. This feature improves server energy efficiency by giving CPUs full power for applications when they need it and reducing power when they do not.
<b>Power workload balancing</b>	Power workload balancing improves performance per watt used and uses the HP Power Regulator technology to manage power at the enclosure level, so that power usage stays within defined power caps. Using power caps, system administrators can constrain the most BTUs per enclosure and rack to enable the enclosure to fit in an existing rack power envelope. A simple power cap will allow devices to power on until power usage reaches the specified power cap and then will prevent any more devices from powering on. Power workload balancing is available now for ProLiant blades and will be available in the future for Integrity blades.

Do you ever wonder how you are going to deploy more servers in a data center that is running out of power or cooling? The heat is on for you to deliver reduced costs while being held accountable to staying environmentally friendly. And the good news is that HP BladeSystems have you covered. You can reduce your ecological and server footprint with HP blades.

HP Thermal Logic technologies make it possible to extend the life of your data center by finding untapped resources and reclaiming them. This takes the guesswork out so that you can improve your data center's potential.

It is often said that you cannot control what you cannot measure. And you can now do both using HP Thermal Logic technology, which combines energy-efficient design with accurate measurement and control without sacrificing performance.

How does this benefit you? You can double the capacity of HP blades servers in the data center with a combination of Dynamic Power Capping and the new BL460c G5. If you are running different blades in your data center, you can optimize them as well.

# Step 7: Choose your power and cooling configurations

## HP Thermal Logic capabilities (continued)

Run your numbers through our Cost and Power Savings Calculator to find out how Thermal Logic will help you save money by optimizing power and cooling for blades.

### **Reduce: Energy-efficient Design**

Find products designed for energy efficiency and learn how we consider energy efficiency at every step of the design phase.

- Efficient server choices for different workloads
- Power-efficient components inside every blade
- Add-on technologies to extend power savings

### **Reclaim: Measure and Control**

Find solutions to help you monitor, track, report, and cap your power consumption.

- Cap and limit enclosure power, not performance
- Comprehensive energy monitoring and control
- Accurate measurement in every system

### **Extend: Optimized Data Center Infrastructure**

Learn how you can reclaim a big chunk of your power and cooling capacity and extend the life of your data center.

- EYP Data Center Design and assessment services
- A complete portfolio of infrastructure products and solutions across the data center
- HP commitment to the environment

Now you can also add virtual capabilities and end-to-end management software.

With your power and cooling needs met through Thermal Logic, how about reducing your cabling and networking headaches? Learn how HP Virtual Connect makes virtualization a reality.

This is not all. Combine Thermal Logic with Insight Software to manage all your HP servers and storage environments from a single console—so that you can easily do more with less headcount.

To stay competitive, your organization needs an IT environment that is right for today and ready to evolve as business needs change. HP Services Technology helps you meet this challenge. Our services are designed to lower your IT costs, increase availability, improve service quality, reduce the complexity of multi-vendor services, and accelerate system implementation.

- To break down costly technology silos, we deliver consulting and integration services that allow you to access, share and synchronize applications and data across your existing heterogeneous environment.
- One of the keys to business success is an agile IT infrastructure that is poised to adapt to changing needs while keeping your business running smoothly. You need to maintain predictable service levels. That is one of the benefits of comprehensive HP support services. We cover the entire IT solution lifecycle, to help you design, deploy, integrate, and manage an agile IT infrastructure—including convenient pre-packaged HP Care Pack Service options and custom support solutions.

## Step 8: Choose services

Keep your blades infrastructures running with the best possible performance.

### HP Services

#### Installation and Startup for HP BladeSystem c-Class Infrastructure

Provides speedy hardware deployment including enclosure for all types of interconnects, direct-attach storage blades plus software deployment of Insight Control management software and either Microsoft or Linux operating system.

#### Enhanced Network Installation and Startup service for HP BladeSystem

Provides advanced network software configuration including configuration of HP Virtual Connect options.

#### HP StorageWorks MSA Family Disk Array Installation and Startup Service

Includes service planning, service deployment, installation verification tests, and customer-oriented sessions.

#### 3-year, 24x7, same-business-day hardware support

Coverage options are available for HP BladeSystem enclosures, HP ProLiant and Integrity server blades, HP BladeSystem SAN switches and HP StorageWorks Ultrium tape blades.

#### HP Support Plus 24

Provides integrated 24x7 4-hour response hardware support with 2-hour response software technical support and software update service.

#### Proactive 24 and Critical Service

Integrated hardware and software support includes proactive and reactive services to improve stability and availability across your environment.

#### Proactive Select

Flexible credit based offering that enables you to purchase consultancy support to help optimize the performance of your Blades environment. Consultancy options include ITSM, Security, Capacity Planning, System Health Checks—Storage, Server, and Network performance optimization and more.

#### Services for NonStop BladeSystem

**HP Service Solutions for NonStop BladeSystem** via three predefined service levels provide quick installation, customized configuration, rapid start-up and 24x7 support:

- Critical Service Solution
- Proactive Service Solution
- Foundation Service Solution

#### **HP Evolution Services for NonStop BladeSystem**

#### **HP Education Services for NonStop BladeSystem**

- Take advantage of HP Insight Remote Support software, providing round-the-clock server and storage monitoring, along with problem resolution and notification, generating service dispatches for issues on HP BladeSystem servers and storage. Helping resolve technical issues quickly and accurately without need to place support phone calls. Available at no additional cost.
- To speed product implementation, look to our factory-direct capabilities. We offer plug-and-play solutions that are integrated, tested, and shipped in a fully configured rack. These services include pre-delivery site review, factory installation and configuration, onsite installation and product orientation.

- In today's fast-paced business environment, your employees need to quickly assimilate new IT skills. To help you achieve this goal, we offer a variety of HP training services, including instructor-led courses, customized onsite training and innovative remotely assisted courses. Visit: [www.hp.com/learn](http://www.hp.com/learn)

To fully capitalize on the capabilities of your IT environment, you need a service partner who thoroughly understands server, storage and network technology and how it behaves in a multi-vendor environment. HP Services Technology working in partnership with HP Authorized Channel Partners has this expertise and skill. Whether your company is a medium-size business or a large global corporation, our service portfolio can help you speedily deploy, improve IT operational efficiency and boost system uptime. For more information, visit: [www.hp.com/services/bladessystemservices](http://www.hp.com/services/bladessystemservices) or [www.hp.com/services/nonstop](http://www.hp.com/services/nonstop)

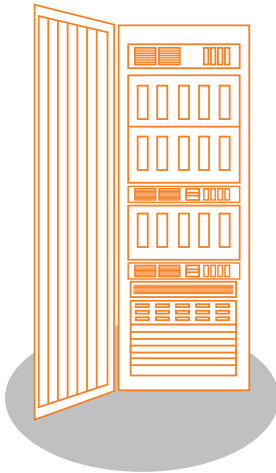
# Specialized blade infrastructure solutions

With a choice of different solutions from NonStop computing to virtual desktops, HP now brings the advantages of blades to a variety of applications and environments. The following solutions are available fully customized and delivered to you built according to your unique specifications.

## HP BladeSystem Matrix



### HP BladeSystem Matrix architecture



#### Matrix Orchestration Environment

The command center for Workflow design and automation, capacity planning, disaster recovery, self-service portal



#### Virtual I/O

Virtual Connect 10GbE and 8Gb FC  
4 to 1 consolidation, carve bandwidth



#### Virtual shared storage

StorageWorks EVA SAN; 65% less connection cost



#### Physical and Virtual servers

Integrity and ProLiant blades; open OS and hypervisor support



#### Pooled Power and Cooling

Energy-aware provisioning, metering, and capping

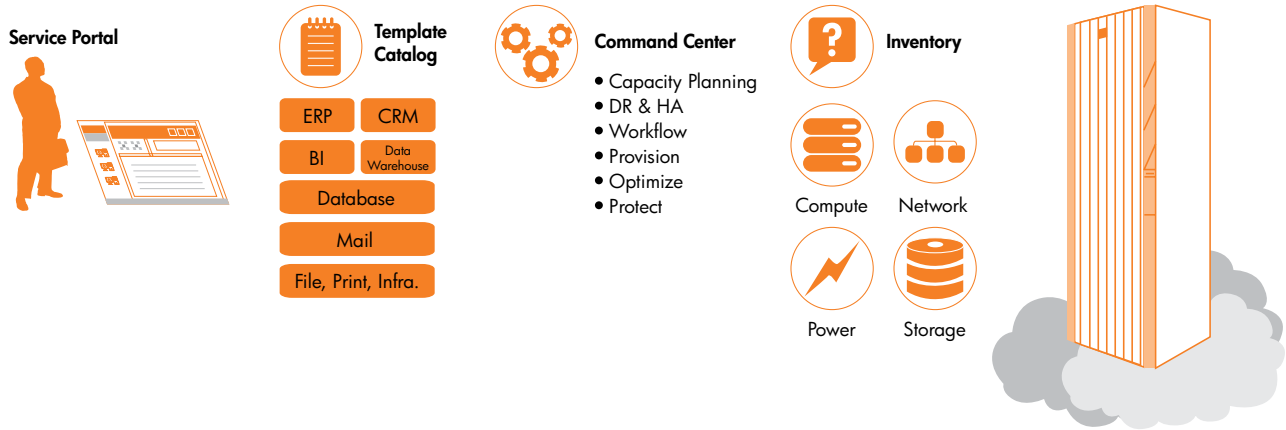
The HP BladeSystem Matrix creates one pool of infrastructure capacity that can be easily carved up to support applications across up to 1000 physical or virtual servers; all managed as one environment in the same way. Think of it like a cloud in a box to simplify how you deliver applications and services to your business.

Ideal for consolidation projects, providing disaster recovery and rapid deployment to production environments, the HP BladeSystem Matrix unites the

tools, processes, and architecture of your physical and virtual worlds. The goal is to help you speed time to service delivery without chaos, take costs out today and keep them out tomorrow.

**Matrix consolidates all resources into a single environment.** It helps you automatically aligns infrastructure capacity for your applications on the fly, then adapts resources to deliver better costs, availability, and quality of service.

HP BladeSystem Matrix is a Cloud infrastructure in a Box



**Matrix accelerates delivery of applications to your business without chaos.** That means predictable infrastructure service delivery with automated resource orchestration that turns best practice design into best practice operation. With Matrix, you can create a catalog of best practice templates for all applications to remove the guess work related to application deployment planning and provisioning based on architectural standards and operational processes you define. The built-in automated workflow engine increases productivity by removing manual steps and coordination among multiple teams to provision and align infrastructure resources to applications. All of

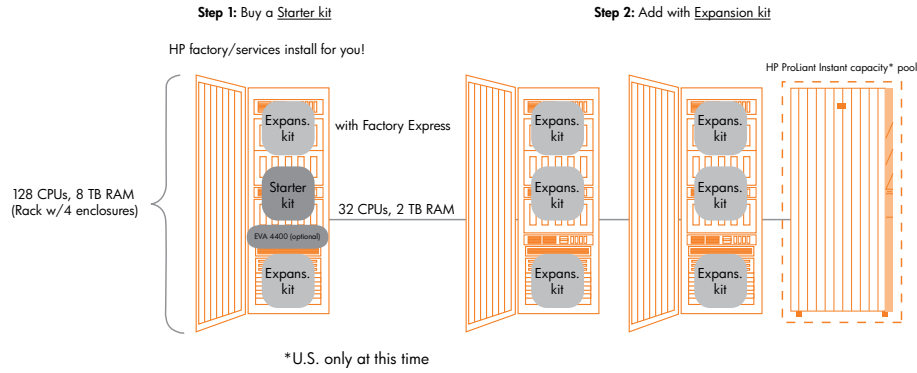
this is made available to the IT staff through a self-service portal for push-button provisioning to reduce time to service delivery to a line of business (LOB) from weeks and months to days and hours.

**Defrag your data center to take cost out today and keep it out tomorrow.** HP BladeSystem Matrix helps you harvest untapped resources, improve utilization of existing capacity and gain a better understanding of ongoing infrastructure costs. It includes built-in capacity planning to simplify planning and forecasting with deep insight into power usage, network bandwidth, and storage capacity.

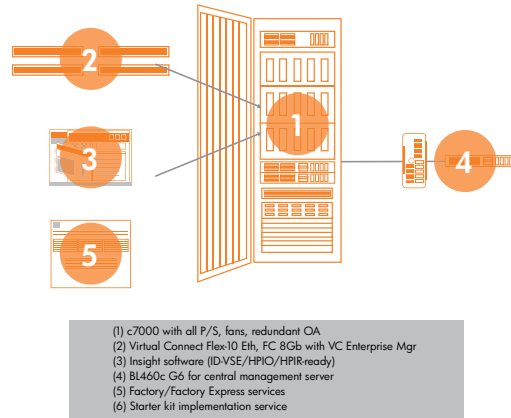
# HP BladeSystem Matrix (continued)

**The adaptive infrastructure that's simple to deploy.** Simplify the integration and expansion of an adaptive infrastructure out of the box with the HP BladeSystem Matrix starter and expansion kits.

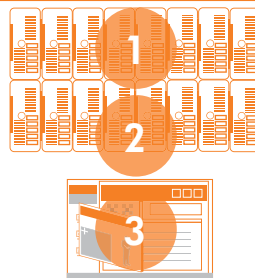
## How do I buy Matrix?



## Starter kit SKUs



## Expansion kit



### Expansion kit SKU

- (1) c7000 with all P/S, fans, redundant OA
- (2) Virtual Connect Flex10 Eth, FC 8Gb modules
- (3) Insight Software (ID-VSE/HPIO/HPIRready/VCEM)

# HP Integrity NonStop BladeSystem

Robust servers that deliver increased availability, unrivaled data integrity, and virtually unlimited scalability.

## HP Integrity NonStop NB5000c BladeSystem

New



### HP Integrity NonStop NB5000c BladeSystem

Highest performance and scalability with industry-leading 24x7 availability and data integrity

<b>Number of processors</b>	2–16 per node
<b>Processors supported</b>	Intel Itanium processor 9100 series (dual-core)
<b>Clustering</b>	Supports ServerNet clustering, scalable up to 4,080 processors
<b>Operating system supported</b>	NonStop OS
<b>Maximum memory</b>	191 TB
<b>ServerNet processor connectivity</b>	InterConnect ServerNet switches
<b>Maximum ServerNet I/O adapters</b>	60
<b>Maximum CLIMs</b>	48 per node
<b>Internal hard disk drives</b>	3,248 FC disks with all IOAME-based storage and IP connectivity; no CLIMs 9,200 SAS disks with all CLIM-based storage and IP connectivity; no IOAME
<b>I/O infrastructure</b>	IP CLIM, storage CLIM (clustered I/O module)
<b>Management</b>	NonStop System Console (NSC), HP Systems Insight Manager
<b>Rack height (EIA unit)</b>	Delivered in modular cabinet(s)

## HP related offerings

### Support services

Three predefined support service levels:

- Critical Service Solution
- Proactive Service Solution
- Foundation Service Solution

### Options

Fibre Channel ServerNet Adapter (FCSA), Ethernet ServerNet Adapter (G4SA)  
Fibre Channel Host Bus Adapter, SAS Host Bus Adapter

### Storage

144 GB and 300 GB FC internal hard disk drives  
72 GB and 146 GB SAS internal hard disk drives  
XP Disk Array family (e.g., XP24000 Disk Array)

### Software

HP NonStop SQL database software, HP NonStop RDF/ZLT replication software

The HP Integrity NonStop NB5000c BladeSystem was designed to deliver the industry's highest application service levels at the best ROI and TCO in its class—based on standards such as the Intel® Itanium® processor, SQL, Web services, J2EE software architecture and more. With today's sophisticated

architectures decision makers often compromise between availability and scalability and are still left with complex, expensive-to-manage infrastructures. HP Integrity NonStop BladeSystem platform delivers these capabilities out of the box significantly simplifying the infrastructure and reducing costs.

# High-performance compute clusters

Scale out your HPC infrastructure with the fastest blade systems available, featuring more processors, greater energy efficiency and increased cooling capabilities. HP BladeSystem-based clusters are fully integrated, tested and ready for the most demanding workloads.

## HP Cluster Platform 3000BL, 4000BL, and 6000BL

	HP Cluster Platform 3000BL	HP Cluster Platform 4000BL	HP Cluster Platform 6000BL
<b>Processor</b>	Intel® Xeon® Processors 5x00 Series: up to 3.16 GHz	AMD® Opteron™ 2000 Series: up to 3.0 GHz/1 MB cache with Dual-core, 2.3 GHz/2 MB with Quad-core <sup>1</sup>	Intel® Itanium®: up to 1.6 GHz/18 MB cache Dual-core
<b>Compute node</b>	ProLiant BL460c, BL480c	ProLiant BL465c, ProLiant BL685c	Integrity BL860c
<b>Utility/control node</b>	ProLiant BL460c, BL480c, ProLiant DL380 G5, DL140 G3 or DL160 G5 <sup>2</sup>	ProLiant BL465c, ProLiant BL685c, ProLiant DL145 G3, DL165 G5 <sup>2</sup> or ProLiant DL385 G2	Integrity BL860c, Integrity rx2660 or Integrity rx3600
<b>BladeSystem enclosure</b>	c7000	c7000	c7000
<b>Number of processors (sockets) per node</b>	2	DL145, DL165, DL385: two BL685, DL585: four	2
<b>Number of nodes</b>	Minimum: 1 utility node, and 4 compute nnodes; maximum: total of 512 nodes (utility + compute nodes)	Minimum: 1 utility node, and 4 compute nnodes; maximum: total of 512 nodes (utility + compute nodes)	Minimum: 1 utility node, and 4 compute nnodes; maximum: total of 512 nodes (utility + compute nodes)
<b>Memory per node</b>	BL460c: up to 32 GB, BL480c: up to 48 GB, DL140/DL160: up to 32 GB, DL380: up to 64 GB	BL465c: up to 32 GB, BL685c: up to 64 GB, DL145/DL165: up to 32 GB, DL385: up to 32 GB, DL585: up to 128 GB	BL860c: up to 48 GB, rx2660: up to 32 GB, rx3600: up to 96 GB
<b>Number of I/O slots</b>	BL460c: up to two mezzanine choices BL480c: up to four mezzanine choices DL140: 2 PCI-E (optional PCI-X) DL160: 2 PCI-E x16 Gen2 DL380: 4 PCI-E (PCI-X optional)	BL465c: up to two mezzanine choices BL685c: up to three mezzanine choices DL145/165: 2 PCI-E (optional HTX and PCI-X), DL385: 4 PCI-E (PCI-X optional) DL585: 9 (mix of PCI-E/PCI-X)	BL860c: up to three mezzanine choices rx2660: choice of 2 PCI-E + 1 PCI-X, or 3 PCI-X rx3600: 8 PCI-X slots or 4 PCI-Express slots + 4 PCI-X slots
<b>Disk/media bays</b>	BL460c/DL140: 2 drives (SAS or SATA) BL480c/DL160: 4 drives (SAS or SATA) DL380: 8 drives (SATA or SAS)	BL465c/BL685c/DL145: 2 drives (SAS or SATA) DL165: 4 drives (SAS or SATA) DL385 and DL585: 8 drives (SAS or SATA SFF)	BL860c: 2 SAS drives rx2660 and rx3600: 8 SAS drives
<b>Cluster interconnect</b>	InfiniBand 4x DDR; Gigabit Ethernet	InfiniBand 4x DDR; Gigabit Ethernet	InfiniBand 4x DDR; Gigabit Ethernet
<b>Management network</b>	10/100 network or Gigabit Ethernet; 10/100 console network to node-based embedded management interfaces. ProCurve switches	10/100 network or Gigabit Ethernet; 10/100 console network to node-based embedded management interfaces. ProCurve switches	10/100 network or Gigabit Ethernet; 10/100 console network to node-based embedded management interfaces. ProCurve switches
<b>SAN storage in cabinet</b>	Optional MSA1500 and MSA20/MSA30 direct attached	Optional MSA1500 and MSA20/MSA30 direct attached	Optional MSA1500 and MSA20/MSA30 direct attached
<b>Operating system options</b>	Linux: Red Hat Enterprise Linux 4 or 5; SUSE SLES 10, Windows Compute Cluster Server 2003, Windows HPC Server 2008	Linux: Red Hat Enterprise Linux 4 or 5; SUSE SLES 10, Windows Compute Cluster Server 2003, Windows HPC Server 2008	Linux: Red Hat Enterprise Linux 4 or 5; and SUSE, SLES 10; HP-UX 11i
<b>Operating environment options</b>	HP-MPI across all operating systems	HP-MPI across all operating systems	HP-MPI across all operating systems
<b>Cluster management software options</b>	Linux: HP XC System Software, HP Cluster Management Utility (CMU) or Scali Manage Windows: Compute Cluster Server	Linux: HP XC System Software, HP Cluster Management Utility (CMU) or Scali Manage Windows: Compute Cluster Server	Linux: HP XC System Software, HP CMU HP Cluster Pack for HP-UX 11i
<b>Warranty</b>	Standard HW warranties; software warranty specific to product options	Standard HW warranties; software warranty specific to product options	Standard HW warranties; software warranty specific to product options

## HP related offerings

### Support services

3-year, 24x7 hardware support, Proactive BladeSystem Service

<sup>1</sup> Processor speed availability varies by node, and reflects those offered on standalone servers. See [www.hp.com](http://www.hp.com) for latest processor choices.

<sup>2</sup> Available Q1 2008.

# HP Cluster Platform Workgroup System

Small technology sites, branch offices and workgroups can accelerate their innovation and productivity with the supercomputer-in-a-box. Delivering almost a teraflop per second of computing in a footprint of only two square feet, the HP Cluster Platform Workgroup System is available for the BladeSystem c3000 rack or tower models with up to eight blades.

## HP Cluster Platform Workgroup System

	Intel® Xeon®-based system	AMD® Opteron™-based system
<b>Processor</b>	Intel® Xeon® Processors 5x00 Series: up to 3.33 GHz	Quad-Core AMD Opteron 2300 Series: Up to 2.3 GHz/2 MB with quad-core
<b>Compute node</b>	ProLiant BL2x220c G5, ProLiant BL260c G5, ProLiant BL460c	ProLiant BL465c G5
<b>Control node</b>	ProLiant BL260c G5, BL2x220c G5, ProLiant BL460c, ProLiant DL380 G5 or DL160 G5	ProLiant BL465c, ProLiant DL165 G5 or ProLiant DL385 G2
<b>BladeSystem enclosure</b>	c3000 tower or rack model	c3000 tower or rack model
<b>Number of processors (sockets) per node</b>	2	2
<b>Number of blades</b>	Up to eight half-height server blades	Up to eight half-height server blades
<b>Number of servers per blade</b>	BL2x220c: two; others: one	1
<b>Memory per node</b>	BL2x220c: up to 16 GB DDR2 memory, BL260c: up to 24 GB DDR2 memory, BL460c: up to 32 GB FB DDR2 memory, DL160: up to 32 GB FB DDR2 memory, DL380: up to 64 GB FB DDR2 memory	BL465c: up to 32 GB DDR2 memory, DL165: up to 32 GB DDR2 memory, DL385: up to 32 GB DDR2 memory
<b>Storage</b>	Extend control node storage (when a BL460c or BL260 is used as the control node): optional SB40c with up to six drives	Extend control node storage (when a BL460c or BL260 is used as the control node): optional SB40c with up to six drives
<b>Number of I/O slots</b>	BL2x220c: 1 PCI-E x8 mezzanine slot per server, BL260c: 1 PCI-E x8 mezzanine connector, BL460c: 2 PCI-E mezzanine connectors (x8 and x4), DL160: 2 PCI-E x16 Gen2, DL380: 4 PCI-E (PCI-X optional)	BL465c: 2 PCI-E mezzanine connectors (x8 and x4), DL165: 2 PCI-E (optional HTX and PCI-X), DL385: 4 PCI-E (PCI-X optional)
<b>Disk/media bays</b>	BL2x220c: 1 Non Hot-Plug SATA drive, BL260c: 2 non hot-plug SFF SATA drives, BL460c: 2 hot-plug SFF drives (SAS or SATA), DL160: 4 3.5-inch drives (SAS or SATA), DL380: 8 hot-plug SFF drives (SATA or SAS)	BL465c: 2 hot-plug SFF drives (SAS or SATA), DL165: 4 3.5-inch drives (SAS or SATA), DL385: 8 hot-plug SFF drives (SAS or SATA)
<b>Cluster interconnect</b>	InfiniBand 4x DDR2; Gigabit Ethernet	InfiniBand 4x DDR2; Gigabit Ethernet
<b>Operating system options</b>	Linux: Red Hat Enterprise Linux 4 or 5; SUSE SLES 10, Windows Compute Cluster Server 2003, Windows HPC Server 2008.	Linux: Red Hat Enterprise Linux 4 or 5; SUSE SLES 10, Windows Compute Cluster Server 2003, Windows HPC Server 2008.
<b>Operating environment options</b>	HP-MPI across all operating systems	HP-MPI across all operating systems
<b>Cluster management software options</b>	Linux: HP XC System Software, HP Cluster Management Utility (CMU), HP ICE-Linux3 or Platform Manager (formerly Scali Manage), Microsoft Windows: Compute Cluster Server	Linux: HP XC System Software, HP Cluster Management Utility (CMU), HP ICE-Linux3 or Platform Manager (formerly Scali Manage), Microsoft Windows: Compute Cluster Server
<b>Warranty</b>	Standard HW warranties; software warranty specific to product options	Standard HW warranties; software warranty specific to product options

## HP related offerings

### Support services

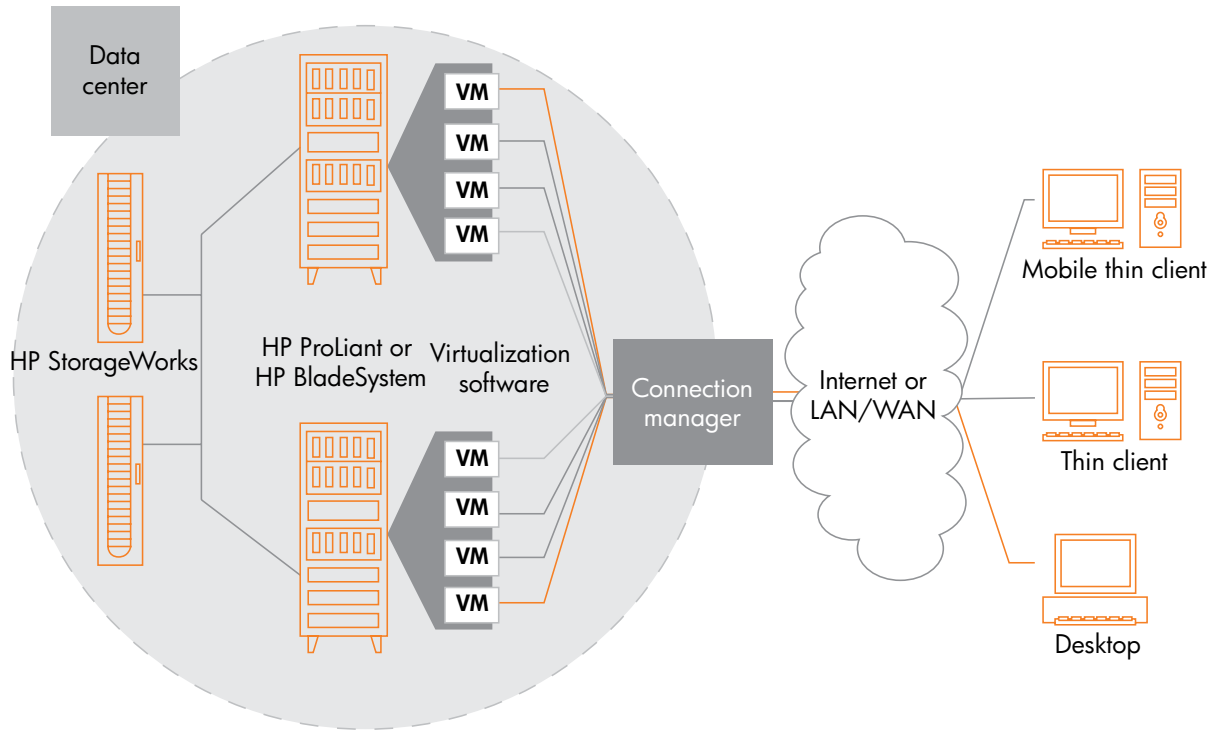
3-year, 24x7 hardware support, Proactive BladeSystem Service

# HP Virtual Desktop Solutions

HP Virtual Desktop Infrastructure (VDI) is a desktop replacement solution that increases security, decreases cost and delivers higher availability for the desktop while continuing to provide end users with the functionality of a stand-alone desktop. HP VDI is comprised of servers, storage, software, management and access devices and is delivered through a combination of HP and partner delivered services.

With HP VDI, the typical heterogeneous desktop environment is replaced with HP Thin Clients on the front end, and HP ProLiant or HP BladeSystem servers with HP StorageWorks external storage or local storage on the back end. For each desktop, an OS is virtualized on the server using virtualization software.

## HP Virtual Desktop Solutions



# HP Blade Workstation Solutions

By combining the centralized security and control of a data center with seamless workstation performance and the flexibility to support professionals in multiple locations, the HP Blade Workstation Solution revolutionizes the business workplace with a new way of working. Solution components include:

- **HP ProLiant xw Series Blade Workstation:** Outstanding performance and scalability with Intel® Xeon® 5400 and 5200 series processors and multi-display hardware accelerated graphics performance for 2D, 3D and streaming video applications. NVIDIA Quadro FX770M (256 MB) and NVIDIA Quadro FX3600M (512 MB) adapter, up to four-display support
- **HP BladeSystem c-Class Data Center Infrastructure:** Consolidates your workstations into a secure, modular unit, packed with intelligence managed within the data center
- **HP ProLiant Essential Management Tools:** Install, configure, monitor, update and troubleshoot ProLiant Blade Workstations remotely from a standard Web browser, command line or script
- **HP Remote Graphics Software Workstation Edition:** Delivers a true workstation experience with full utilization of blade workstation hardware and graphics resources
- **HP Session Allocation Manager:** Maps available resource to users and streamlines login process
- **Access Clients:** High performance dual-display, with up to quad-display graphics support and removable media for increased data security

## HP Blade Workstation Solution



**HP ProLiant xw460c Blade Workstation**  
Delivers uncompromised workstation-class compute power with data center class security, high density, and scalability.

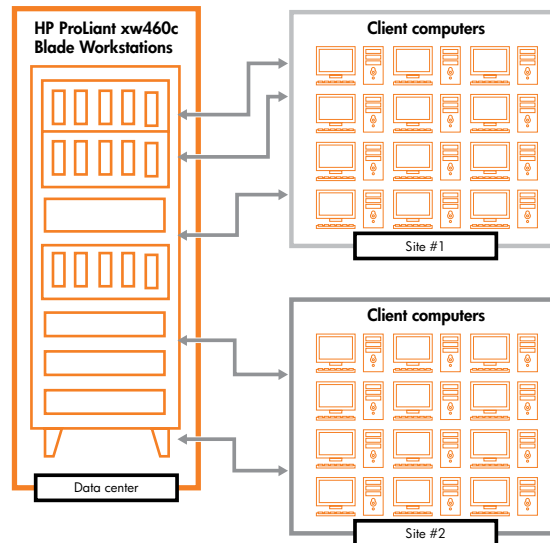


**HP ProLiant xw460c Blade Workstation with Expansion**  
The graphics expansion module allows use of ultra-high end desktop graphics in the blade environment delivering extreme performance.



**HP ProLiant xw2x220c Blade Workstation**  
An ideal choice for customers interested in uncompromised workstation class experience at even higher density than standard blades.

<b>Number of processors per node</b>	1-2	1-2	1-2
<b>Maximum number of cores per node</b>	8	8	8
<b>Processors supported</b>	Dual- and Quad-core Intel® Xeon® processors: up to 3.33 GHz	Dual- and Quad-core Intel® Xeon® processors: up to 3.33 GHz	Dual- and Quad-core Intel® Xeon® processors: up to 3.33 GHz
<b>Cache</b>	Up to 12 MB L2 (2 x 6 MB) 5400 Series Quad-core	Up to 12 MB L2 (2 x 6 MB) 5400 Series Quad-core	Up to 12 MB L2 (2 x 6 MB) 5400 Series Quad-core
<b>Maximum memory per node</b>	64 GB	64 GB	32 GB
<b>Network ports per node</b>	2	2	2
<b>Drives supported per node</b>	Up to 2	Up to 2	1
<b>Maximum internal storage per node</b>	292 GB	292 GB	250 GB
<b>I/O expansion</b>	2 PCIe mezzanine expansion slots (May be occupied by graphics)	N/A	1 PCIe mezzanine expansion slot per node (occupied by graphics)
<b>Graphics</b>	NVIDIA Quadro FX 770M/FX 3600M	NVIDIA Quadro FX 5800/FX 5600/ FX 4800/FX 3700	NVIDIA Quadro FX 770M
<b>Form factor</b>	6U or 10U enclosure	6U or 10U enclosure	6U or 10U enclosure
<b>Warranty (parts/labor/onsite)</b>	3-year/3-year/3-year	3-year/3-year/3-year	3-year/3-year/3-year



## HP puts it all together

To gain the full value from your investments, you need expert services across the IT lifecycle, intelligent software, advanced storage devices and system-enhancing options. HP is committed to meeting your exact needs.

- **Services:** How important is it that your service partner provides a single point of ownership and accountability? Are your service needs met across your enterprise? Have you reached the mission-critical reliability you require to meet your business needs? From training and basic product support to selective outsourcing, our services help you realize the full potential of your technology and keep your environment up and running.
- **Management software:** Do you need an efficient, in-depth way to understand, manage, and optimize your infrastructure? Get more from every hour, watt, and dollar you invest in your infrastructure with HP Insight software.

- **Storage devices:** Do you need help optimizing your storage resources, managing multi-vendor environments and evolving to open architectures? Our network and direct-attached storage devices help you keep large amounts of information protected and readily accessible to people when needed.
- **Server options:** Do you have everything you need to meet your infrastructure needs? Our server options—including memory, drives, processors, racks, operating system software, power, and cooling—help fine-tune your solution by enhancing system performance and functionality.

To learn more about other HP server, workstation and storage products, contact your local HP representative, your authorized HP reseller or visit:

[www.hp.com/go/proliant](http://www.hp.com/go/proliant)

[www.hp.com/go/integrity](http://www.hp.com/go/integrity)

[www.hp.com/go/nonstop](http://www.hp.com/go/nonstop)

[www.hp.com/go/arrays](http://www.hp.com/go/arrays)

[www.hp.com/go/san](http://www.hp.com/go/san)

[www.hp.com/go/insight](http://www.hp.com/go/insight)

[www.hp.com/go/storageblades](http://www.hp.com/go/storageblades)

[www.hp.com/go/virtualization](http://www.hp.com/go/virtualization)

## HP Financial Services

Not every technology acquisition has to be a traditional cash-and-carry transaction. HP Financial Services offers a variety of customized leasing and financing options to facilitate your HP BladeSystem purchase and keep your technology expenditures in line with your overall budget. For more information, visit: [www.hp.com/go/hpfinancialservices](http://www.hp.com/go/hpfinancialservices)

## Evaluate

The BladeSystem Evaluation Center contains interactive demos, videos, webinars, TCO calculators, detailed technical data and more. For more information, visit: [www.hp.com/go/bladesystem/evaluate](http://www.hp.com/go/bladesystem/evaluate)

## Unlimited possibilities for your business

A BladeSystem is simply a smarter way to build an infrastructure that supports the vital applications your business requires, with fewer wires, lower electric bills, and none of the headaches you might find with the other choices you have today.

All of this adds up to big savings for your IT budget that can be re-invested back into your business. With your streamlined foundation in place, you can also deliver topline business results to grow, get to market faster, and empower your employees, partners, and customers more effectively.

Wherever you plan to take your business in the future, the HP BladeSystem will be ready when you get there.

## Technology for better business outcomes

To learn more, visit [www.hp.com/go/bladesystem](http://www.hp.com/go/bladesystem)

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