Build IT better with HP BladeSystem

invent

Cut costs, increase benefits—get more value

If you think blades are only smaller servers flipped on their sides, you are missing the point. You're not alone—most of HP's competitors are missing it, too. Building a great server blade is just one part of the HP BladeSystem infrastructure story.

At its best, an infrastructure should be boring—never thought about, never questioned, always ready. Built right, it is simple and can be the difference between winning and losing. At its worst, it is unnecessarily complex, inflexible, unresponsive, and more expensive to maintain than it should be.

Ultimately, the power of BladeSystem value is about only one thing—simplification—through consolidation, integration, and superior management—across the complete infrastructure.

More value = taking out the costs + increasing the benefits.

That's the basic value equation BladeSystem solutions are designed to deliver beyond traditional infrastructure designs: Take out costs through integration and consolidation of all physical components and add more benefits through superior management, virtualization, and automation. This approach means that nearly any application, workload, or IT service suitable for an x86 environment is simply more efficient, flexible, and agile with an HP BladeSystem.

This guide will

- Take you through the simple steps to build an HP BladeSystem solution
- Illustrate why BladeSystem is a better platform for nearly any Microsoft® Windows® or Linux® application
- Show how HP can help you to profitably transform the infrastructure supporting your business with blade technology and services

Simplifying infrastructure

Certainly, BladeSystem solutions are less expensive up front than traditional infrastructures and can save space and power. But at the end of the day, it is the complexity in today's environment that drives costs and prevents your business from realizing the full potential of your IT investment.

BladeSystem takes the advantages of today's industry-standard computing to its next logical step.

BladeSystem brings together the silos of your IT department—the technology, people, and processes—and integrates them with a simplified solution platform ready for change. It makes the advantages of virtualization real by helping you divide or pool your compute, storage, and network resources to suit any workload, ensuring you never again have resources untapped and capacity underutilized. Finally, it takes the manual processes and automates them so that your staff can focus on the strategic, not the tactical.

What's an HP BladeSystem and why are so many businesses deploying it?
A server blade is an evolution of the traditional rack-mounted server. It is essentially a server card that "plugs into" a common enclosure. Each HP server blade has the standard features such as processors, memory, and network interface connections plus the innovation common to many HP ProLiant servers that make them the world's most manageable, reliable, and easy-to-service platforms.

The power of BladeSystem value is about simplification—through consolidation, integration, and superior management—across the complete infrastructure.

Like a server blade, a BladeSystem is the evolution of the entire rack-mounted infrastructure. A BladeSystem aims to simplify the management, building, and maintenance of the infrastructure behind your multi-server environment. It consolidates and repackages all the supporting infrastructure elements—compute, storage, network, and power into a single platform that can accelerate the integration and optimization of your data center.

A BladeSystem enables you to

- Improve infrastructure manageability by keeping solutions secure, reliable, and consistent
- Automate more tasks to save administrative time and expense
- Streamline operating system, application, and patch updates
- Capture best practices and reduce human error
- Maximize performance, price/performance, and performance per watt
- Improve utilization of server, storage, and network components and save space and power
- Reduce the number of cables required and the time spent managing cables in the data center
- Build a more flexible and cost-effective modular computing environment

Is an HP BladeSystem right for your infrastructure?

First consider your application. Typically, any Linux or Windows application running on one, two, or four processors, with x86-based technology, is ideally suited. With a single enclosure holding up to 16 servers that can be inserted or replaced by nontechnical staff yet maintained by technical staff remotely, a BladeSystem is also ideal for growing businesses, branch offices, and remote sites.

If your application relies on clustering or a distributed, multi-tier environment requiring a large number of processors in the environment, a BladeSystem may be advantageous.

Finally, with technologies such as clustered file systems and storage area network (SAN), a BladeSystem can be an ideal platform for migrating custom and packaged UNIX® applications running on proprietary symmetric multiprocessing (SMP) servers, such as Sun Solaris systems, to a modular BladeSystem solution.

Ten years ago, many customers wondered if rack-mounted or x86 servers should replace tower and proprietary servers. Today, the majority of units sold are rack-mounted x86 servers, while server blades represent the fastest-growing new segment of the market.

A BladeSystem optimizes and advances the principles of a rack environment. It simply repackages the entire infrastructure—beyond the server—and integrates it with network, storage, and power for greater convenience and efficiency within a dynamic, multi-server environment.

The other key improvement in such an environment is from the integration and consolidation of management tools. Management is connected and built in across all infrastructure elements and controlled from one console with features like automation and virtualization designed to simplify the common tasks.

HP BladeSystem solutions are an evolution of traditional server and infrastructure design.

For example, a SQL server doesn't run significantly faster on a server blade than on the latest ProLiant server. Yet the advantage of having that SQL server blade and the rest of the infrastructure integrated into a BladeSystem featuring virtual LAN (VLAN) and SAN technology delivers superior cost, flexibility, and efficiency advantages.[1]

A BladeSystem can

- Be at least 15 percent less expensive up front[2]
- Reduce cabling by 87 percent[3]
- Reduce the time to implement changes, updates, and reconfigurations from four hours to 30 minutes[4]
- Reduce space by more than eight times[5]
- Reduce average unplanned downtime and planned downtime by more than 50 percent[6]

For a more complete examination of the cost and TCO savings of an HP BladeSystem, view the white paper available at **http://h71028.www7.hp.com/erc/downloads/5982-6701en.pdf**.

In most cases, where more than five servers are considered, BladeSystem should be the first platform evaluated for most Linux and Microsoft Windows applications, including consolidations, migrations, and updates of existing applications, operating systems, and aging hardware.

[1] Once the blade infrastructure is in place, adding a new server significantly reduces the time to rack, cable, and provision the operating system, as well as configure VLAN and storage connections. Similarly, changes also take less time.

[2] Figures are based on comparisons between 8 HP ProLiant DL380 Servers and 8 HP ProLiant BL30p Servers with similar features and connecting network and Fibre Channel SAN infrastructures using available Internet List Pricing available on www.hp.com. A detailed comparison of the configurations and pricing can be found at http://h71028.www7.hp.com/erc/downloads/5982-6701en.pdf.

[3] For redundant connections to an Ethernet network, standard HP ProLiant servers require 2 to 4 cables per server. From the shared connectivity of the HP BladeSystem, 8 to 16 servers can be connected redundantly to the network with 2 to 4 per enclosure. An 8 server comparison yields 16 to 32 cables required for rack-mounted ProLiant servers and 2 to 4 cables required for an HP BladeSystem; an 87.5 percent reduction in the number of cables.

[4] Based on industry average metrics, the time to deploy a single rack-mounted ProLiant server averages approximately 4 hours compared to 30 minutes for a ProLiant server blade. Once the blade infrastructure is in place, adding a new server significantly reduces the time to rack, cable, and provision the operating system, and configure VLAN and storage connections. Similarly, changes also take less time.

[5] A standard 42U rack can hold up to 96 HP ProLiant BL30p Server Blades and with the use of VMware server virtualization tools, an average of eight physical servers can be migrated to a single server blade. The same configuration would require up to 18 42U racks filled with 1U servers.

[6] Overall availability of BladeSystem solutions is higher due to increased redundancy of infrastructure components, reduced time to repair problems, increased automation of setup, and reduced time to make changes. The average reduction in planned downtime per year is 7.5 hours for HP BladeSystem solutions versus HP standalone rack servers.

HP BladeSystem p-Class enclosure

When to consider an HP BladeSystem:

- Need a more flexible and efficient IT architecture that can scale as you grow
- Need to simply provision and maintain many operating systems, applications, or patches across multiple servers
- Need to deploy new resources frequently or make changes often
- Must reduce ownership costs of proprietary servers and operating systems
- Have a distributed infrastructure
- Would like a modular compute environment that integrates connectivity, storage, and power
- Have an application that requires many servers or processors
- Are building service-oriented architectures, clusters, or grids

Likewise, a traditional HP ProLiant or Integrity server may be a better choice if:

- Server will not be deployed in a data center environment
- Low server volume deployment (fewer than five servers)
- Special PCI slot card requirements
- Requirements are for large local storage and local tape streaming
- Requirements are highest reliability and performing HP SMP servers
- Cable consolidation and space consolidation are not concerns

What are the basic components needed to build an HP BladeSystem?

Choose an enclosure

A BladeSystem enclosure holds up to 16 ProLiant server blades plus redundant network and storage switches. It includes a shared, high-speed backplane for wire-once connectivity of server blades to network, shared storage, and power.

A management module is built in to the enclosure that reports asset and inventory information and thermal, power, and protection fuse events. With hardware management integrated across the solution, one full enclosure can be managed as easily as one server.

A BladeSystem enclosure provides the following benefits:

- **Scalable:** Management and network interconnects extend scalability beyond a single enclosure, allowing resources to be pooled and shared across multiple enclosures.
- **Investment protection:** Accommodates multiple server and network designs in one enclosure.
- **Service and management:** Allows multiple administrators to remotely access and maintain multiple servers simultaneously (versus other choices that only allow one session at a time).

HP BladeSystem Ethernet and Fibre Channel networking options

Cisco Gigabit Ethernet Switch Module	16 Gigabit Ethernet downlink ports to servers, 2 Gigabit Ethernet cross-connect ports that are internal to the enclosure, 2 front-panel Gigabit Ethernet ports, and 4 small form factor pluggable (SFP) uplink ports
Brocade Fibre Channel Switch Module	4 Gb SAN Switch, supports 8 BL2xp or 16 BL3xp server connections, 4 dedicated SAN facing ports, 3 factory configured versions
McData Fibre Channel Switch Module	4 Gb SAN Switch, supports 8 BL2xp or 16 BL3xp server connections, 2 dedicated SAN facing ports
Nortel GbE2 Switch Module for HP ProLiant BL p-class blade servers	Consolidation of 1000 Mb/s Gigabit Ethernet NIC signals, advanced network capabilities, and Fibre Channel signal pass-through, or Brocade Fibre Channel switch
HP RJ-45 Patch Panels	Provides both Ethernet and Fibre Channel signal pass-through

HP offers many networking options, including the Cisco Gigabit Ethernet Switch Module for HP BladeSystem.

Choose the network switches

HP also offers one of the broadest selections of Gigabit Ethernet and Fibre Channel switches and patch panel options in the industry to provide network, SAN/network attached storage (NAS), and cluster connectivity.

Network switches provide

- **Seamless integration:** Standard-based switch options include Cisco, Brocade, McDATA, and Nortel products that integrate within your existing standards.
- **Built-in redundancy:** Front-mounting, hot plug switches that can be removed and replaced without the need to cable or recable network connections.
- **Cable reduction:** Fully VLAN-capable interconnect switches provide up to 32-to-1 network cable reductions per server blade enclosure.

Choose your compute blades

Delivering best-in-class performance, choice and reliability on Intel® Xeon™ and AMD Opteron™ processors for Windows or Linux based systems, the HP portfolio of server blades supports a variety of application requirements for scale-out architectures. HP offers one-, two-, and four-processor server blades, including the widest range of performance, and form factors, and the most processing density and performance of any other portfolio.

Server blades provide

- **ProLiant confidence:** A legacy of trusted reliability and price/performance leadership has made it the number 1 industry-standard server for business.
- **Intelligent innovation:** Combined with a demonstrated commitment to standards and engineering excellence, helping to simplify ownership and improve efficiency.
- **More choice:** The right technology at the right price delivered with a wide choice of essential tools, solutions, and support to give you more control and flexibility.

Choose your storage environment

BladeSystem solutions fully support boot-from-SAN capabilities and is fully optimized for the HP StorageWorks family. In addition, a BladeSystem supports HP backup, tape storage systems, and active archiving solutions to provide complete information lifecycle management as well as support for EMC, Hitachi, and IBM SAN technology.

Storage environment benefits include

- **Stateless computing:** BladeSystem fully supports boot-from-SAN capabilities to maximize storage consolidation and efficiency of overall system deployment.
- **Extend virtualization:** Utilize more resources and automate more processes more efficiently by sharing and pooling servers, storage, and network.
- **Commonality:** The ability to buy HP BladeSystem and StorageWorks solutions from a single vendor provides common server and storage management tools and a complete services organization.

The HP BladeSystem portfolio delivers many choices of size and performance.

HP BladeSystem server portfolio

Workload	Server	Density	Best for…
Front- and mid-tier infrastructure applications HPC/HA Clustering	ProLiant BL20p 1–2P Intel Xeon	48 servers 96 processors	• Cache advantaged applications • Basic infrastructure applications • Small mail and messaging, and databases
	ProLiant BL25p 1–2P AMD Opteron™	48 servers 96 processors	• Web applications • Compute-intensive applications • Memory latency advantaged applications
Front- and mid-tier infrastructure applications Optimized for external storage HPC/HA Clustering	ProLiant BL30p 1–2P Intel Xeon	96 servers 192 processors	• Cache advantaged applications • Basic infrastructure applications • Small mail and messaging, and databases
	ProLiant BL35p 1–2P AMD Opteron™	96 servers 192 processors	• Web Applications • Compute-intensive applications • Memory latency advantaged applications • HPC
Large mail and messaging, e-commerce databases, data warehouse and mining HPC/HA Clustering	ProLiant BL40p 1–4P Intel Xeon	12 servers 48 processors	• Clock-speed and cache advantaged applications • Highest serviceability and expandability • Memory RAID and hot plug PCI-X
	ProLiant BL45p 1–4P dual-core AMD Opteron™	24 servers 96 processors	• Largest memory footprint, leading price/performance • Compute-intensive applications • Memory latency advantaged applications • Compute clusters

HP BladeSystem solutions are optimized for HP StorageWorks storage solutions.

HP StorageWorks porfolio of solutions for the HP BladeSystem

Solution	Best for…
MSA family	• Smaller deployments, including remote office locations • Most affordable data protection and performance features in their class
EVA family	• Moderate to large size data centers running key business applications • High-performance data protection • Powerful storage management and virtualization
XP family	• Mission-critical applications • Most extensible, resilient, and controllable storage • Best data protection and disaster-tolerant features
HP ProLiant storage servers (NAS)	• File serving and exchange environments for small businesses, branch offices, and enterprise data center customers

HP BladeSystem power solution

HP offers a wide variety of management tools to manage your solution.

Choose your power subsystem

The efficient design of the BladeSystem power subsystem reduces power distribution costs and provides power capacity for current and future server blades. Power supplies are centralized to provide scalable, redundant power for a single enclosure of blades up to an entire rack full. HP offers fully redundant 1U and 3U power supply options for configurations of different sizes, supporting both single- and three-phase power.

BladeSystem power subsystems provide

- **Continuous power availability:** N + N redundant power supplies are front accessible, hot pluggable, and can be configured for changing power requirements.
- **Investment protection:** Provides power capacity headroom for future power needs and compatibility with all server blade models.
- **Flexibility:** Rack-centralized power options for efficient multi-enclosure and multi-rack server blade installations. The new all-in-one 1U power enclosure brings the benefits of server blades to remote sites and small-office deployments.

Choose the management tools for your needs

Manage hundreds of server, storage, and network resources as easily as one system—from a single control console—remotely. The tools are optimized for the unique design of HP BladeSystem solutions but extend to manage and control your existing infrastructure. The result is more efficiency at lower cost; scalability without compromise; and a universal, service-oriented infrastructure built for change.

Management tools for BladeSystem solutions provide

- **Consolidation through HP Systems Insight Manager Software:** One of the most popular and widely installed platforms for detailed fault management and monitoring.
- **Standard interfaces:** BladeSystem management tools can be used to control the rest of your infrastructure and manage multi-tiered, multi-operating system environments.
- **One access point to many resources:** The unique design of the BladeSystem enclosure requires fewer people to manage and provides more security by reducing physical contact with the infrastructure.

HP BladeSystem management tools

Monitor and alert
- Automatically discover, inventory, and monitor resources
- Proactively secure and monitor performance and reliability to enable consistent IT service levels
- Receive alerts to resolve issues before they impact the bottom line

HP Systems Insight Manager
This software quickly navigates the BladeSystem, including blade servers and desktops, enclosure infrastructures, racks, and integrated switches, through hierarchical tree views. Conveniently configures, deploys, and manages individual or groups of resources.*

Analyze and control
- Analysis of performance to enable optimization of resources
- Control functions to automate tasks based on policies
- Automate lifecycle management tasks and optimize resource utilization to free time for innovation

ProLiant Essentials Performance Management Pack
This is an integrated performance management solution that detects and analyzes hardware performance bottlenecks.*

ProLiant Essentials Intelligent Networking Pack
This pack allows blade servers to adapt and change network paths to achieve improved reliability and performance. The pack detects and analyzes network bottlenecks or broken network linkages.

HP Power Regulator technology
This technology enables dynamic server power state changes based on user requirements and throttles server power and prevents hardware thermal events, allowing more servers to be provisioned per rack, and improves energy efficiency.

Provision and patch
- Provision, repurpose, and patch resources automatically to implement change faster and simply
- Implement change logically and without changing the physical infrastructure

HP BladeSystem setup via Integrated Lights-Out (iLO) technology
This is an embedded wizard with rack visualization display that guides users through initial HP Integrated Lights-Out (iLO) technology and blade server configuration as well as the installation an operating system via Virtual Media.

Vulnerability and Patch Management Pack
This pack integrates vulnerability assessment and patch management functions into Systems Insight Manager to identify and remediate security vulnerabilities quickly, efficiently, and reliably.*

ProLiant Essentials Rapid Deployment Pack
The de facto, automated deployment, and provisioning engine for BladeSystem.*

Recover and scale
- Enable automated recovery of resources
- Create pools of capacity that can be dynamically allocated to fit business demands

Automation Manager
This provides policy-driven automation across groups of resources, including server, SAN storage, and data network and enables proactive, automated action across groups for dynamic scaling, provisioning, and automated recovery.

Virtual Machine Management Pack
This pack provides management and control of virtual machines (VMs) from Microsoft and VMware and manages both physical and virtual resources from a single management console.

ProLiant Essentials Workload Management Pack
This pack is for Windows server based platforms to configure resource partitions and define application boundaries based on their allocated quantity of processor and memory resources.

*Included in the HP BladeSystem Management Suite bundle.

What is the difference between the HP BladeSystem versus other blade choices?

Innovating across the integrated system, not just the server
HP aims to eliminate islands of infrastructure by bringing together the key infrastructure elements into a single system controlled by one management console. The BladeSystem approach simplifies both the physical configuration and the logical management of resources.

HP is working to expand the notion of blades beyond typical server environments, bringing the BladeSystem advantage to client, network, and storage infrastructures. By collapsing the complexity and consolidating more technology assets into the data center and closer to the IT experts, HP can drive the "BladeSystem advantage" to all corners of the business.

Integration into one system provides

- Management of multiple resources as one system
- Hardware and software configuration security and consistency
- Elimination of excess infrastructure
- Wire-once connectivity

Ensuring consistency so you can adapt to change without changing everything
You have investments in technology, tools, and processes. You've spent years bringing together the best and brightest IT personnel with skills that enable them to deliver results. HP BladeSystem solutions help your staff deliver more to your business without starting over.

Unlike other blade options, HP BladeSystem solutions were designed to live easily within your environment, use the same tools and processes, and make your existing IT work better—together.

Uniquely, HP uses the same management tools and processes to manage all your HP servers (ProLiant and Integrity systems), StorageWorks solutions, and networks. We incorporate the familiar standards and HP innovations you rely on today and support the same applications for Linux and Windows systems that run your business. In addition, you can use the same racks, connect to your existing SANs and NAS storage solutions, and increase the efficiency of your existing power and cooling systems.

No one builds a better server than the HP ProLiant servers. That's why we took that heritage—along with our leading management, storage, and network innovations, as well as with the partners and service expertise you depend on—and integrated it all within the components of BladeSystem solutions.

Removing barriers to adoption with the standards you care about

Blade standards should work toward a customer's advantage—not to an individual vendor. HP's approach to standards is aimed at removing the barriers to adoption and making it easy and seamless to incorporate the advantage of blade technologies into your environment without disruption.

HP offers the industry's most complete management suite to transform server blades into a BladeSystem.

Standards should be about using the technologies you have standardized in your current environment and building your expertise around them. That's why HP partners with others in the industry to develop common management and network interfaces, builds the BladeSystem on common industry-standard hardware components, and recruits the industry's leading hardware and software partners to integrate within it.

Windows and Linux; Intel and AMD; Ethernet, Fibre Channel, serial attached SCSI (SAS), and Internet SCSI (iSCSI); these are only a few of the familiar names and standards you'll find as part of the BladeSystem environment. Likewise, we look to partners like Cisco Systems, Brocade, Nortel, and McDATA to help ensure HP BladeSystem solutions connect to your existing networks and can be managed in the way you want. Finally, we are leading the integration of emerging standards like x86 64 bit, SAS and iSCSI, SMASH, and SMI Specification (SMI-S) technology.

Delivering the broadest portfolio in the industry

One size doesn't fit all. If blade technology is to fulfill its promise for the mainstream of customers, the same breadth of choices must be available to meet the myriad demands of businesses of all sizes. With BladeSystem, HP simply offers the most choices to build a complete blade infrastructure in the industry—compute node options, complete storage solutions, complete Gigabit Ethernet and Fibre Channel networking, and the power distribution system built for future demands. We have the most complete management suite available for a blade environment and bring to the table the leading services and partners to create solutions that meet individual customers' needs.

Building a complete ecosystem

HP delivers a complete ecosystem behind BladeSystem designed to work within your standards, your existing environment, and your needs, so that you can bring the advantages to any solution for your business. Thousands of applications from hundreds of vertical and horizontal software solution providers are supported on BladeSystem for both Linux and Windows environments.

Whether with processors from Intel or AMD, HP takes a "chipnostic" approach and helps you select the best processor combination for your solution. In addition, HP works with leading network infrastructure providers such as Cisco, Brocade, Nortel, QLogic, McDATA, and others to continue to expand your fabric interconnect options and to simplify the deployment within your established standards. In addition, HP BladeSystem is optimized for HP StorageWorks SAN, NAS, and Information Lifecycle Management (ILM) storage solutions and provides support for SANs from EMC, Hitachi, and IBM.

Next, HP brings everything together with solutions and services that increase the potential of your BladeSystem infrastructure. Whether you are putting a new solution in place or you are planning to consolidate, migrate, or update, HP Services provides the expertise and assistance you need to maximize the potential of your infrastructure. HP also supports our channel partners with training and other programs to help them meet the needs of BladeSystem customers confidently.

HP brings together innovations from several IHVs, ISVs, channel resellers, and system integrators to enable a broad community to deliver the blade value to our mutual customers. When combined, HP and our partner community deliver complete solutions, tools and services to make the move to BladeSystem easier.

HP delivers a complete ecosystem behind BladeSystem that is designed to work within your standards, your existing environment, and your needs.

Investing to build the industry's best management innovations

HP's industry-leading portfolio of capabilities is designed to improve the potential of the BladeSystem while being consistent with the management of the rest of an HP infrastructure.

BladeSystem management begins with a bundled suite of essential tools and a broad choice of enhanced options to enable automated, policy-based management of the BladeSystem—compute, storage, and network elements. HP then extends this world-class infrastructure management with HP OpenView Software for the most robust and comprehensive service-level management available today.

The HP BladeSystem Management Suite is a complete set of tools for deployment, optimization, patch management, and event handling—all integrated into a common interface within HP Systems Insight Manager, the industry's most widely used server management application. To make it easy to choose, the BladeSystem Management Suite is available as a single item to order, and to make it affordable, significant savings can be realized when purchasing the suite as part of a solution.

HP Systems Insight Manager and the BladeSystem Management Suite provide the backbone for your infrastructure operations, improving administrator productivity and increasing the server-to-administrator ratio. You can get similar capabilities elsewhere, but nowhere is it all brought together using a common operational model.

What are the steps I can take to simplify my infrastructure with an HP BladeSystem?

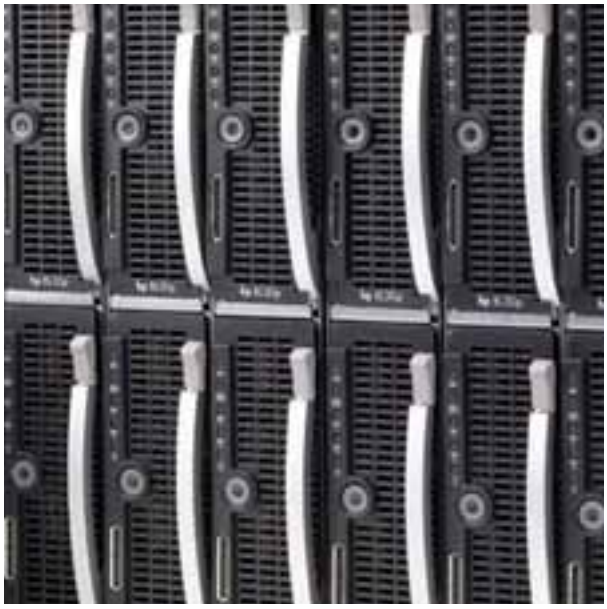
Step 1: Virtualize and consolidate your network

Integrate secure and dedicated VLANs to optimize network performance and incorporate IP load balancing and traffic management to create a completely virtualized networking environment. This step is key to improving the efficiency of building, scaling, and supporting any BladeSystem solution.

The BladeSystem greatly simplifies cabling and reduces connectivity costs. Through the use of integrated blade switches with VLAN technology, and integrated Fiber Channel switches, multiple cables are consolidated down to a few uplink cables per enclosure.

A BladeSystem is wired once and can be reconfigured through software, eliminating the need to reconfigure the physical cables. It also eliminates the need for KVM switches and cables by providing an iLO management capability over IP. This feature alone can save as much as US$25,000 for each rack of 1U rack-mounted servers.

Advanced network interconnect options from HP, Cisco Systems, Nortel, and other industry partners allow VLANs that separate available network bandwidth into multiple independent and secure networks. IT services can be assigned network resources dynamically and transparently.



What's the value of VLANs and integrated network switches within BladeSystem solutions?

- **Reduces downtime from cabling errors**
- **Improves management efficiency by speeding deployment and reprovisioning**
- **Cuts networking costs per port, reduces costs of cabling, and eliminates extra equipment**

Step 2: Consolidate your multi-server environment
As you optimize your environment with BladeSystem, you need to adapt concurrently to future business requirements—whether they're market related, regulatory, or customer driven. Consolidating your server environment is an ideal first step to streamlining your solution.

Beyond lower platform costs, the key advantage to IT consolidation on any platform is improved management efficiency. The integrated BladeSystem simply magnifies the management benefits of any consolidation effort. With virtualization capabilities, you can consolidate multiple underutilized, out-of-date servers onto a more modular, versatile solution—not only saving space, but also reducing long-term operational costs.

HP BladeSystem solutions put virtualization technologies to work for you.

VMware

This virtual infrastructure software transforms your BladeSystem into a pool of logical computing resources. Deploy multiple, additional virtual "server blades" running on each of your existing blades. Your applications and services can be deployed in secure and portable virtual machines, which can be provisioned, consolidated, and managed across your server blades.

System resources are dynamically allocated to any virtual machine based on need, providing a high degree of blade utilization and operational flexibility. You can even migrate the workload of a running virtual machine from one blade to another without interrupting user sessions.

Microsoft Virtual Server

A complete virtual machine solution for the Windows Server 2003 operating system, Virtual Server 2005 features robust storage, networking, and management features in an easy-to-use package that includes a simple, seven-step installation and a convenient Web-based management console. It provides hardware benefits through virtual machine isolation, while resource management enables multiple workloads to coexist on fewer servers.

HP Virtual Machine Manager (VMM)

Integrated with Systems Insight Manager, HP Virtual Machine Manager (VMM) provides central-control physical servers and virtual machines from Microsoft and VMware running on them from a single console.

Additional add-ons to VMM automate Physical to Virtual (P2V) migrations and balance the workload across host servers.

Why server consolidation?	• Standardization • Physical security • Improve management • Business continuity • Reduce server numbers
Prime candidates	• Development environments • Web and e-commerce applications • Mail and messaging applications • Virtual clients, thin clients, and terminal services • Infrastructure applications
Benefits with HP BladeSystem	• Reduce space more than 8:1 • Reduce cabling by 87% • Maximize performance per watt • N + 1 redundancy for built-in protection

Step 3: Consolidate your storage and Fibre Channel infrastructure

BladeSystem fully supports boot-from-SAN capabilities to improve the storage consolidation and efficiency of overall system deployment. In addition, server blades can integrate with "fused" NAS and SAN configurations, providing the ability to work in file and block environments seamlessly, and support multiple types of clustered configurations. They also enable integration with HP backup, tape storage systems, and active archiving solutions to provide complete information lifecycle management.

BladeSystem servers are optimized for HP StorageWorks arrays and NAS solutions and can attach to select third-party SAN solutions. With this choice of storage options, you can select the right storage solution for your needs—from high-performance direct-attached storage options to the simplicity of NAS or the scalability of SAN storage solutions.

On average, a Fibre Channel SAN interconnect solution can be a very expensive and often complex network environment. By integrating familiar Brocade Fibre Channel switch standards within the BladeSystem, you can significantly reduce the cost and complexity of connecting servers to storage arrays, yet still enjoy all the benefits of today's SAN infrastructure. A fully integrated blade switch solution reduces the installation time and accelerates the startup and architectural design considerations for SAN fabric deployments.

Step 4: Deploy applications across the infrastructure

Collapse multi-tiered environments and scale-out applications:

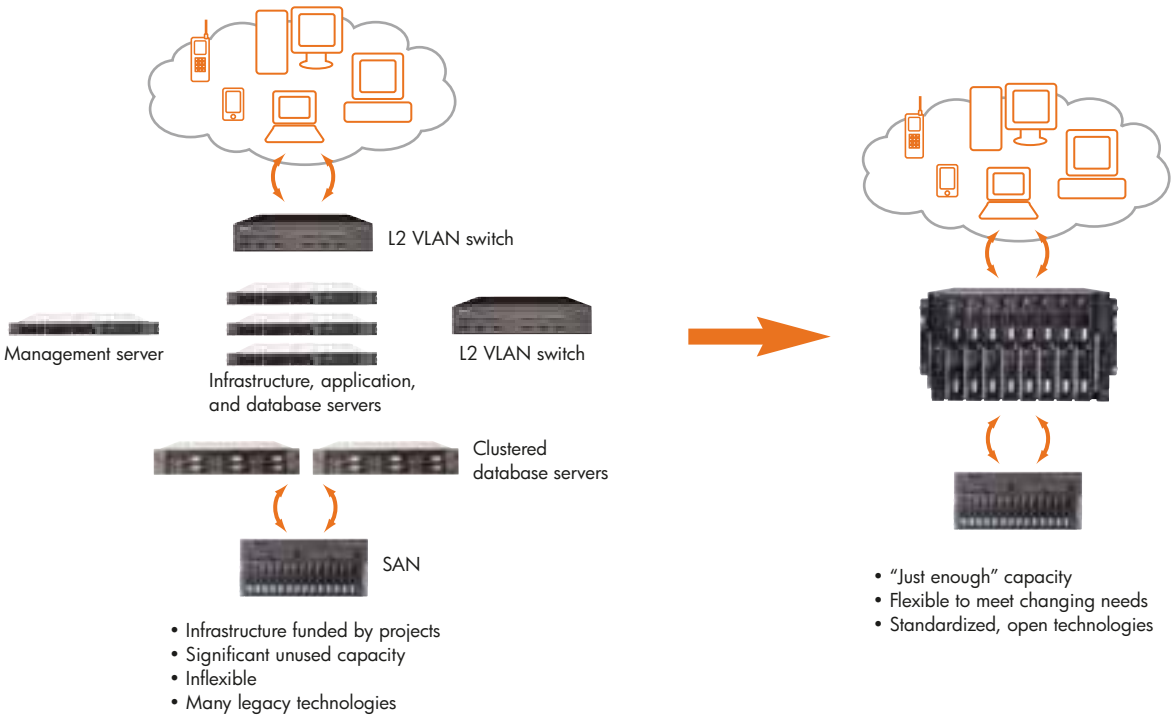
- Web and e-commerce applications
- Streaming media
- Mail and messaging
- Small and medium databases
- Enterprise applications such as enterprise resource planning (ERP) and customer relationship management (CRM)

With multiple data center resources networked together, BladeSystem is a natural fit for multi-tiered and scalable applications like SAP and Oracle®. Imagine putting Web, application, and database tiers within a single box—an ideal solution for cutting data center complexity or for remote sites.

Migrate from UNIX to Linux systems and consolidate and save:

- Basic Linux infrastructure such as Web, file/print, messaging, and security
- Custom (homegrown) applications (file based and relational database based)
- Enterprise applications such as large scale-out databases, ERP, and CRM

Simplify how infrastructure is planned, deployed, and funded.



Migrating from UNIX systems to highly efficient Linux blade solutions can reduce platform costs significantly and result in significant long-term savings as a result of increased data center efficiency. By leveraging virtual storage, cluster file systems, and scale-out multi-node database environments, BladeSystems can also deliver lower annual support costs, lower the costs of achieving high availability, and provide more control and flexibility.

Build a better HPC cluster:

- Technical computation clusters for life sciences, CAE, and so on
- "Visualization" clusters for the entertainment or oil and gas industries
- Financial and portfolio analysis: computation clusters

By capitalizing on the density, efficiency, and integrated technologies of BladeSystem, it is easier to build large compute clusters, in conjunction with Grid middleware, to handle the most intense HPC requirements.

Step 5. Establish best practices around HP management tools

Improving your management processes and applying new tools to simplify and integrate IT management is critical to increasing the overall efficiency of a BladeSystem infrastructure. HP's management solution brings together the technologies, people, and processes across multiple resources to improve each phase of ownership. These tools encompass deployment, optimization, hardware and software maintenance, virtualization, automation, and event handling—all integrated into a common interface.

As detailed above, HP offers comprehensive tools and partners with industry leaders to extend the capabilities of your infrastructure. Most of these tools are simple, plug-in additions to Systems Insight Manager and OpenView Software. These tools are not only built to take advantage of the potential of a bladed architecture, but also to extend control of other HP servers, storage systems, and network from the same tools and a single console. Take the management as far as you want—from basic simplification of monitoring and maintenance to complete service-level management.

Based on Systems Insight Manager and OpenView Software, HP's management solution provides a more efficient and reliable backbone for your infrastructure operations, improving administrator productivity and increasing the server-to-administrator ratio.

The outcome: A simplified infrastructure built better with HP BladeSystem

- Merge separate management domains and centralize control across the data center
- Adopt new management capabilities like automation and virtualization
- Save people time in installation, upgrades, and maintenance
- Improve utilization of compute, storage, and network capacity
- Lower acquisition costs of complete infrastructure
- Use fewer cables, and less space and power/heat
- Lower connection costs to SANs with fewer uplink ports
- Build in fault tolerance and redundancy across the infrastructure
- Improve performance, price/performance, and performance per watt
- Extend modular scalability to mix and match to meet workload demands
- Build an infrastructure for an adaptive enterprise that's ready for tomorrows' challenges

HP Services

The most critical aspects of adopting a BladeSystem and undertaking a consolidation and simplification project are bringing about data center readiness and understanding the current drivers of inefficiency and cost. HP offers a complete data center assessment service, covering security issues, hardware and software support requirements, enterprise management, mission-critical support, data migration, and more.

Power and cooling are central issues today, regardless of the architecture being adopted. To provide adequate power and cooling for the future, HP employs power calculator tools and offers a complete Smart Cooling Service to implement a solution that meets specific requirements.

HP BladeSystems can also become the foundation for a utility computing model through the HP Instant Capacity solutions. The Instant Capacity program automates and streamlines acquisition, deployment, and billing. Server blades are delivered and activated only when they are needed. By placing preconfigured server blades and other components on site, resources are available for deployment within minutes, versus days. When a server is activated, the business is invoiced for that server plus only a corresponding percentage of the infrastructure.

To simplify the ordering, configuration, and deployment of complete BladeSystem solutions, customers may choose HP Factory Express services. HP's factory-direct capabilities speed project implementation, delivering plug-and-play blade solutions completely integrated and shipped in a fully configured rack. HP Services on-site installation and startup options for BladeSystem implementation together offer fast and effective services to get your BladeSystem infrastructure up and running speedily.

Gain more efficiency, flexibility, and agility with an HP BladeSystem.

HP also offers optional management services to provide an extra level of support beyond standard warranty coverage, including 24 x 7 technical support, high-availability services, and proactive remote services that alert administrators to faulty conditions before they affect customers.

With 65,000 service professionals in 170 countries, HP provides the largest IT customer support organization in the world. Moreover, with our in-depth technology expertise, global strategic partnerships, and more than 40 years of IT experience, IT organizations are assured of obtaining a quality solution that delivers higher levels of performance and flexibility at a lower cost.

HP Financial Services

Beyond having the industry's strongest portfolio of products, services, people tools, methodologies, and world-class partnerships, HP makes it easy on the balance sheet to put the power of the HP portfolio to work for you through HP Financial Services.

HP Financial Services offers a complete array of leasing and financial lifecycle management services in over 50 countries around the world. We can help you transition from existing equipment to the latest technology, acquire a new solution cost-effectively, and manage that solution throughout its lifecycle. Our goal is to help you increase the return on your IT investment, reduce risk, and get the most from your HP solution. HP Financial Services delivers more.

Summary

The HP BladeSystem delivers the future of data center computing—today—providing a fast track for building an adaptive enterprise. BladeSystems are a catalyst for embracing change and achieving dramatic improvements in data center productivity and efficiency, offering compelling advantages over traditional server environments.

With a consolidated and automated environment for managing servers, storage, power, and networks, the BladeSystem simplifies your data center, enabling administrators to support a greater number of IT resources. In addition, through the use of modular blades and virtualization technologies, you gain the flexibility to dynamically adapt your IT resources to changing business needs—easily and cost-effectively. And with so many capabilities built in, BladeSystem solutions accelerate the adoption of new technologies that create broader possibilities for improving efficiency across the data center.

More value means taking out the costs and increasing the benefits. That's the value BladeSystem solutions are designed to deliver. And that is why nearly any application, workload, or IT server is more efficient, flexible, and agile than current infrastructure designs.

Build IT better with HP BladeSystem.

Build IT better with HP BladeSystem

To learn more, visit www.hp.com/go/bladesystem

5982-5541EN Rev. 1, 05/20/2005