HP BladeSystem strategy for rapid deployment and reprovisioning of high-density systems

technology brief, 2nd edition

Abstract

The HP BladeSystem is an integral part of HP infrastructure for the Adaptive Enterprise. This brief identifies critical challenges facing information technology (IT) organizations, describes HP's strategy in developing the HP BladeSystem, and explains how major computing challenges are addressed.

IT resource challenges

While under pressure to lower costs and achieve greater operational efficiency, IT organizations must support a variety of business initiatives. For many corporations, today's goal is to transform themselves into adaptive enterprises in which IT provides a single set of dynamically scalable resources that internal business users can access as required.

As the IT role transforms to one of enterprise service provider, IT organizations must automate key processes to maximize utilization of resources. The ability to scale both up and down automatically and deliver IT service in a utility-like fashion requires a highly adaptive, integrated computing infrastructure.

HP BladeSystem strategy

Recognizing the challenges of the current environment, HP developed an integrated family of server blade products known as the HP BladeSystem. This family of server blade products provides a foundation of an adaptive IT infrastructure.

The strategy for the HP BladeSystem solution includes the following objectives:

- Develop a system that facilitates a wired-once, intelligent infrastructure based on industry standards and supports multiple generations of server blades.
- Create a system flexible enough to allow customers to create pools of resources to support workloads of any size or type.
- Provide automation, virtualization, and security tools that eliminate manual processes across the IT organization allowing greater efficiency and adaptability, while freeing up IT staff resources for innovation.

The HP BladeSystem includes an entire portfolio of industry-standard server blades with a common interface for use in multi-tiered computing environments requiring everything from front-end infrastructure servers, desktops, and workstations to higher performance mid-tier application servers as well as back-end and database servers. The target market for these solutions includes large enterprise customers and service providers who require high levels of flexibility and efficiency from their IT organizations and an overall better return on their IT investment.

As part of the HP BladeSystem program, HP developed a modular infrastructure that customers can quickly deploy in standard racks alongside existing legacy servers, storage, and networking devices. HP also developed tools to enable rapid reallocation of resources for on-demand computing.

ProLiant Server Blades

ProLiant server blades are an important part of the HP BladeSystem that addresses all levels of a multi-tiered architecture. The ProLiant server blade line reflects an open strategy for networking and storage and spans two- and four-processor systems. The HP BladeSystem enables enterprise data centers, service providers, and telecommunications companies to build a complete, adaptive infrastructure using modular building blocks including server blades. ProLiant server blades maximize value and strengthen commonality by taking advantage of HP management and system deployment technology developed for all HP BladeSystem products.

The ProLiant server blade portfolio provides specific customer benefits including:

- Dense form factors that provide better utilization of data center rack space
- More efficient use of data center power resources
- Fewer network and power cables
- Management software designed for optimal control of blade resources
- Investment protection for existing infrastructure and hardware
- Increased serviceability through modularity and simplified spares inventory

Modular infrastructure

The modular infrastructure of the HP BladeSystem separates components to help provide maximum flexibility, upgradeability and investment protection for customers. The HP BladeSystem includes four key components:

- Server blades
- Server blade and power enclosures
- Network interconnects
- Flexible power subsystem options

The HP BladeSystem architecture is designed to protect customer investments in two important ways: it enables mixed generations of ProLiant server blades, server blade options, and network interconnect options to be used interchangeably and to share common network and power infrastructure. It also enables installation HP BladeSystem products in standard racks along with legacy servers, storage, and network devices.

Server blades

ProLiant server blades are designed for rapid deployment and provisioning, virtual presence and control, and rip-and-replace serviceability. The ProLiant product line consists of the ProLiant BL20p series, the BL30p series, and the BL40p series server blades. The ProLiant BL20p series server blade, which supports two Intel® Xeon™ DP processors and dual, hot-plug SCSI hard drives, is generally used for traditional front-end and mid-tier server workloads. The ProLiant BL30p series server blade also supports two Intel Xeon DP processors but it features a smaller footprint and is optimized for stateless computing, compute farms, and external storage solutions. The ProLiant BL40p series server blade supports four Intel Xeon MP processors and is ideal for back-end infrastructure applications such as databases and messaging applications.

For detailed specifications on ProLiant server blades, refer to the website at www.hp.com/go/bladesystem.

Server blade and power enclosures

The HP BladeSystem includes server blade enclosures and power supply enclosures that install easily in standard HP, third-party, and telecommunication (telco) racks, allowing customers to deploy HP BladeSystem solutions along with legacy hardware. The HP BladeSystem also provides the option of using local facility DC power, if available. AC power supplies may be substituted with optional bus bars and/or bus boxes that connect directly to -48 VDC ($\pm$ 10%) power for a clean, efficient installation.

Network Interconnects

The HP BladeSystem was designed so that each server blade has redundant connections to both external network and external storage. HP offers flexible interconnect options that provide network cable pass-through and cable aggregation depending on customer requirements. Multiple interconnect options for ProLiant BL server blade enclosures give customers flexibility to choose the solution they prefer and the modular design enables upgradeability and serviceability.

Disaggregating subsystems traditionally found inside a monolithic server requires looking at the tasks of management and deployment differently. For example, if the power subsystem is no longer located within the server chassis, then IT administrators need the ability to manage not only at the server level, but also at the enclosure and rack levels.

HP BladeSystem server blades and interconnect options report their unique physical location to the user through HP Systems Insight Manager and the integrated Lights-Out (iLO) interface of each server blade. Standards-based inter-enclosure communication allows management data and messages to be relayed between connected server blade enclosures, compatible rack monitors, storage enclosures, and uninterruptible power supplies. The inter-enclosure communication also enables the rack topology and location (rack/enclosure/bay) naming functionality in management tools such as HP Systems Insight Manager and Rapid Deployment Pack. The inter-enclosure communication is designed to minimize cabling and allow the overall solution to isolate faults to specific locations, which increases availability and reduces risk to protection.

Rack-centralized power subsystem

The rack-centralized power subsystem of the HP BladeSystem is decoupled from the individual server blades for efficiency, availability, and serviceability. Enabling such dense server deployment and disaggregating the power subsystem for HP BladeSystem products requires an innovative management and monitoring solution. HP designed management modules for the server blade enclosures that monitor power and overall enclosure health. In addition, server blade management modules are connected to a power management module in each power enclosure that monitors power available from the power enclosure and from each power supply it contains.

Deployment and management technology

As an integral part of the HP BladeSystem solution, HP has designed hardware and developed configuration and management tools that allow rapid volume deployment through a common management interface across HP BladeSystem products. Deployment tools include both hardware configuration aids and server provisioning utilities.

Planning Tools

To assist in facilities planning and preparing a site for installation of HP BladeSystem products, HP developed the HP BladeSystem Sizing Utility. The utility contains interactive calculators that generate site planning information such as floor space requirements, power distribution requirements, and environmental specifications based on criteria entered by the user. The sizing utility is a powerful planning tool that helps users to determine parameters including:

- The amount of DC power each rack will require for reliable operation
- The ProLiant BL power subsystem needs for specific installations
- The amount of facility AC infrastructure and AC load required to support each rack, such as the number of required power circuits
- The amount of heat load that each rack of ProLiant BL server blades will generate
- The approximate weight of and floor space required for each rack of ProLiant BL servers

HP has also developed a set of white papers for guidance in establishing deployment infrastructure and a power plan. The following whitepapers can be found at www.hp.com/go/bladesystem:

- "HP BladeSystem Overview and Planning"
- "HP ProLiant BL System Best Practices Guide"
- "HP ProLiant BL System Common Procedures Guide"

Deployment tools

Traditional methods of server deployment can be time-consuming and labor-intensive, particularly when tens or hundreds of systems must be deployed quickly, consistently, and reliably. The ProLiant Essentials Rapid Deployment Pack (RDP) automates the process of deploying and provisioning server software and configuring HP BladeSystem interconnect options. This automation enables users to quickly and easily adapt their infrastructure as business needs change. RDP integrates two powerful products: Altiris Deployment Solution and the HP SmartStart Scripting Toolkit. Altiris Deployment Solution features industry-standard Preboot eXecution Environment (PXE) technology and multicasting technology. The SmartStart Scripting Toolkit includes a modular set of utilities for automating many steps in the process of configuring ProLiant servers. Sample server configuration scripts provide IT administrators a head start in customizing the tool to match individual customer needs.

RDP is a fast, easy, drag-and-drop solution for deploying HP BladeSystem servers and interconnect options using either imaging or scripting, and for maintaining software images. Users can do all this from a single, centralized deployment console. The deployment console is available in both Microsoft ® Windows® and Linux® consoles. It can maintain a history of changes and provisioning performed on a given system.

RDP has been optimized for use with HP BladeSystem products, particularly ProLiant servers. Enhancements include the ability to perform rip-and-replace with blades (automatic provisioning of replacement blade upon insertion in enclosure) and pre-provisioning of blade bays prior to blade being installed or even procured. RDP automatically detects and displays blades based on their rack, enclosure, and bay location. Using information supplied from the server blade enclosure (such as enclosure name and slot identification), RDP can automatically provision the server using a preconfigured script and image.

More information about the ProLiant Essentials Rapid Deployment Pack solution is available at www.hp.com/servers/rdp.

System management tools

HP offers a comprehensive and integrated suite of management tools that deliver a number of usage scenarios including:

- Automated end-to-end provisioning – Enables provisioning across computer, network, and storage components in minutes
- Automated recovery – Provides cost-efficient high availability through resources pooling and auto-recovery
- Scheduled re-provisioning – Improves efficiency in system utilization through resource pooling and automated DAS- or SAN-based recovery.
- Dynamic scaling – Scales infrastructure up or down dynamically, according to performance or service level needs
- IT consolidation – Consolidates legacy computer nodes into virtual systems on m high performance blade platforms
- Automated vulnerability scanning and security patching – Enables users to assess and respond to potential security issues

Depending on an infrastructure's size, needs, and purpose, one or more of the following management tools may be used:

- HP Systems Insight Manager
- Performance Management Pack
- Integrated Lights-Out Advanced Pack (standard with all ProLiant server blades)
- Policy-Based Automation Pack
- Intelligent Networking Pack
- Vulnerability & Patch Management Pack
- Virtual Machine Management Pack
- Workload Management Pack

Systems Insight Manager

HP Systems Insight Manager (SIM) has become the industry-leading web-based, enterprise resource management console. Systems Insight Manager is a comprehensive tool that tracks fault, performance, and management information. Systems Insight Manager enables IT administrators to monitor and manage groups of servers, server clusters, clients, and networking peripherals from a central location using a web browser. The latest version of SIM included, with the Virtual Machine Management Pack, supports plug-in capability to manage virtual machines running either Microsoft Virtual Server 2005 or VMware ESX/GSX Server.

Vulnerability & Patch Management Pack is a ProLiant Essential that integrates with SIM 4.2 and includes OS and application vulnerability scanning and patch management capabilities.

Systems Insight Manager is capable of discovering and managing devices from HP and other vendors using Simple Network Management Protocol (SNMP), Desktop Management Interface (DMI), and Hypertext Transfer Protocol (HTTP). Systems Insight Manager logs alerts from these devices, and it sends email or pager notifications of alerts to the appropriate person based on the assigned roles and responsibilities of the IT staff. To enable customers to most effectively manage server blade systems, Systems Insight Manager provides additional functionality such as easy tree navigation of physical and logical groupings of blade components and a graphical display of server blade enclosures, server blades, and interconnect options that enhance the user interface. This capability installs automatically with SIM 4.2 or later and is provided at no additional fee.

Enhancements to Systems Insight Manager will be provided through future plug-ins. Additional information about System Insight Manger is available at www.hp.com/go/hpsim.

Performance Management Pack

The HP Performance Management Pack (PMP) is an integrated management solution that detects and analyzes hardware bottlenecks on HP ProLiant servers running either the Windows or Linux operating system. Installed as a plug-in to SIM, PMP helps IT personnel to analyze system performance and address issues before they become economic liabilities.

Integrated Lights-Out Advanced Pack

HP Integrated Lights-Out (iLO) Advanced Pack offers industry-leading remote management capabilities for ProLiant servers. Included as standard on all HP ProLiant BL server blades, the iLO Advanced Pack provides virtual administrator functions such as:

- Remote KVM control of server functions (including shut down and boot up)
- Operating system deployment using SmartStart or custom CD through virtual media functionality
- Blade group configuration replication
- Integration of Windows Terminal Services and virtual media support
- Directory services support to simplify management of multiple devices

For HP BladeSystem products, iLO provides some additional management and initial setup capability "out of the box." An initial setup wizard provides a simple four-step process to set up an initial blade, its iLO, RAID configuration, OS, and more without requiring such management environment prerequisites as Dynamic Host Configuration Protocol (DHCP) or PXE.

Policy-Based Automation Pack

The Policy-Based Automation Pack provides policy-driven automation across groups of blade system resources including servers, SAN storage, and data networks. This pack enables pro-active, automated, dynamic scaling, end-to-end provisioning, and automated recovery across groups of resources.

Intelligent Networking Pack

HP has developed the Intelligent Networking Pack that enables servers to automatically bypass network bottlenecks and improve network availability well beyond the first tier of switches. This functionality allows a server to seek out the most cost-effective path that will yield higher bandwidth and performance.

Workload Management Pack

The ProLiant Essentials Workload Management Pack (WMP) is a software solution that controls and dynamically allocates system resources to optimize application utilization and performance for Windows 2000 platforms. The WMP software provides the tools needed to fully utilize system resources and maximize business value.

Future directions

The HP BladeSystem program is an example of how HP is driving its strategy for the Adaptive Enterprise — from servers, storage, and networking to automated provisioning and remote management software—to maximize customers' return on IT investment.

Investment protection

One way in which HP BladeSystem products are designed to protect customer investments is by providing longevity of the infrastructure. While the installation of ProLiant server blades into standard racks is a relatively straightforward concept, providing longevity in the blade infrastructure to support multiple generations of processors and networking technologies is a greater challenge.

Another area of investment protection that HP focuses on is management functionality that builds on, is common with, and yet provides advanced capabilities for server blades. This provides the ability for customers to have investment protection in the training and expertise that they already have in HP's industry-standards-based innovative management capabilities.

Through careful planning and design of power supplies, switches, and cooling capabilities, HP has designed investment protection into HP BladeSystem solutions by providing interchangeability of different server blade models, different server blade generations, and different networking and storage options. Because ProLiant server blades are supported by HP and leading third-party SAN storage vendors, customers' investments in storage solutions are protected as well.

Utility blade vision

HP BladeSystem solutions will continue to evolve and play a major role in the Adaptive Enterprise environment to provide IT services in a utility-like fashion. The modularity and intelligent infrastructure allows data center architects to create solutions that are much more powerful, compact, efficient, and flexible.

Revolutionary improvements and advancements in fabric technologies will extend infrastructure capabilities and enable the utility blade vision. Remote Direct Memory Access (RDMA) technology will provide scalability and performance for the I/O subsystem and enable interconnect consolidation. Connecting blade components over an Internet Protocol (IP) fabric, such as RDMA over Transmission Control Protocol (TCP), will improve performance and utilization while simplifying and unifying the infrastructure.

Software tool development

HP software tools are designed to be sustained and enhanced by future plug-ins and upgrades. Further development of deployment, management, and virtualization tools will allow higher levels of consolidation and more automation that will increase hardware utilization, lower IT personnel involvement, and reduce total cost of ownership (TCO).

Conclusion

In developing and expanding the HP BladeSystem portfolio, HP continues to extend its leadership in providing innovative solutions that directly address the changing needs of businesses.

ProLiant server blades are optimized for use with HP ProLiant Essentials software tools that selectively extend the functionality of an adaptive infrastructure to address specific business problems and needs. These software tools enable IT administrators to configure and install operating systems and applications automatically to a few, hundreds, or thousands of systems simultaneously.

For more information

For more information about the HP BladeSystem portfolio, refer to the resources listed below.

Resource description	Web address
HP BladeSystem web page (includes specifications, planning tools, technical briefs, and white papers)	www.hp.com/go/bladesystem
HP BladeSystem management web page	http://h18004.www1.hp.com/products/blades/components/management.html
ProLiant Essentials Rapid Deployment Pack web page	www.hp.com/servers/rdp

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TC041208TB, 12/2004