

## TECHNICAL BRIEF

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### Next-Generation Management Software for Blade Environments

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#### Introduction

Hewlett-Packard (HP) designed the HP BladeSystem portfolio to address some of the key total cost of ownership (TCO) issues facing today's datacenter, including server management costs, utilization, and power and cooling. Since the launch of the HP BladeSystem c-Class family in 2006, HP has risen to claim the number 1 spot in the blade server market. As part of the BladeSystem, HP features three fundamental technologies:

- ☒ HP Insight Software for infrastructure management
- ☒ HP Virtual Connect for virtual I/O networking
- ☒ HP Thermal Logic for power and cooling

These technologies play a central role in reducing overall datacenter operating expenses. They also differentiate HP BladeSystem both from competitive blade offerings and from rack-optimized servers.

In this technical brief, IDC examines HP Insight Software and the importance of manageability in the selection of a blade platform with ProLiant servers. It joins the IDC white paper *Gaining Business Value and ROI with HP Insight Control*, which describes the overall ROI and benefits of Insight Control management software, as well as the technical briefs *Next-Generation Technology for Virtual I/O and Blade Servers* and *Next-Generation Power and Cooling for Blade Environments*, which focus on the operational and cost advantages of HP Virtual Connect technologies and HP Thermal Logic, respectively.

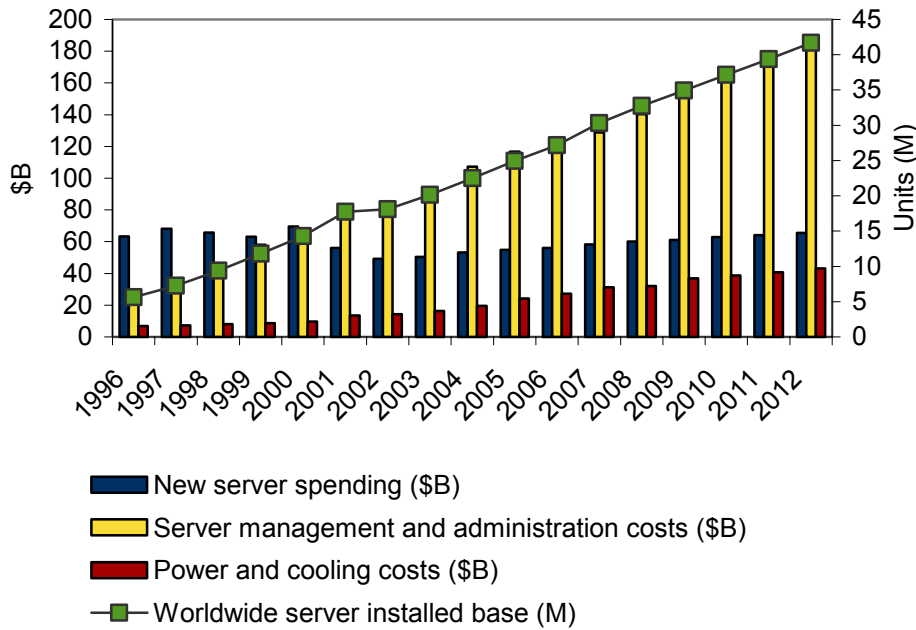
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#### Datacenters Look to Streamline Management Complexity and Reduce TCO

In today's datacenter, management and administration costs have grown to eclipse all other cost categories. Driven by an explosion in the installed base of servers (see Figure 1), the personnel cost required to manage and maintain servers has put a strain on the majority of businesses' datacenter IT budgets. As a result, IT budgets are coming under closer scrutiny, with an eye toward identifying solutions that can demonstrably reduce costs by simplifying IT infrastructures and automating management processes.

**FIGURE 1**

Worldwide IT Spending on Servers, Power and Cooling, and Management/Administration, 1996–2012



Source: IDC, 2008

Over the past 15 years, two primary factors have driven the dramatic increase in the worldwide server-installed base:

- ☒ **Expanding server footprint.** Most core business process applications are supported by multiple servers. Two, three, or even five or more servers per application are not uncommon. And with new processes such as email and Web-based applications coming online every day, these additions only increase the number of servers an organization must support.
  
- ☒ **Shift in the server mix.** Twenty years ago an organization might have purchased a handful of mainframes and could have reasonably expected those systems to handle all of its IT needs. However, as pressure grew to reduce initial acquisition costs and new lower-priced technologies continued to be introduced, customer-buying patterns evolved accordingly. With each technology transition, the cost of acquisition came down by an order of magnitude, with today's x86 systems averaging around \$4,000 per system. These lower price points allow customers to distribute systems more widely throughout their organizations, to the point where it is not uncommon for datacenters to support 5,000 or more servers, most of which support a single application.

In addition, server sprawl has led to a number of other problems for today's IT organizations:

- ☒ **Inflexibility.** As currently deployed by most organizations, server configurations are static, hardwired, and difficult to change.
- ☒ **Manual coordination.** Maintaining and changing applications or server configuration require too many people to perform too many manual steps.
- ☒ **Underutilization.** With 1:1 application-to-server deployment ratios, only a fraction of most servers' total capacity is typically utilized.
- ☒ **Overprovisioning.** Hand in hand with underutilization, overprovisioning results in wasted rack space, power, cooling, bandwidth, and operational costs.
- ☒ **Unique management requirements.** Many processes and applications supported by servers are unique, requiring IT organizations to maintain individual tools and coordinate inconsistent configurations to handle them all.

In sum, server infrastructures can often consume large amounts of space, power, and IT administration time. The costs associated with deploying, monitoring, and managing servers have escalated to the point where IT organizations are actively seeking tools to help them manage costs by streamlining management and automating key server management tasks throughout the datacenter.

### ***Enterprises Introducing Blades Require Good Management Tools***

Many enterprises have looked to address these issues by adopting blade technologies. While blades can help address space and even power issues by introducing blade-centric technologies, there are no intrinsic manageability benefits for blades compared with other types of servers. Next-generation management tools are needed that streamline the end-to-end management of blade systems.

These tools will support widespread virtualization and policy-based automation. They will introduce abstraction layers to create dynamic pools of IT resources, enabling administrators to directly manage services and proactively address business workloads rather than manage the underlying infrastructure. This is a fundamental building block to making IT service management (ITSM) best practices a reality.

Key manageability attributes should allow users to:

- ☒ Lower the cost of IT operations by improving asset utilization and reducing the headcount to asset ratio
- ☒ Provide necessary tools to ensure that IT services are up, running, and available at all times
- ☒ Optimize the IT infrastructure to support the IT organization's service-level objectives and changing business needs

## **HP BladeSystem**

HP has made manageability central to the design of its HP BladeSystem portfolio. Specifically, HP has taken steps to deliver integrated infrastructure technologies and flexible management software to help customers address today's operational pain points while putting themselves on a path to creating their own next-generation datacenter.

Core design principles include modularity and choice — enabling customers to adopt key features and integrate them when they are ready. This approach enables:

- ☒ **Just-in-time provisioning.** BladeSystem servers and their network connections can be preprovisioned and wired once. When reconfiguration is required, it can be done quickly and easily.
- ☒ **Automated change management.** Domains and people are isolated from the upheavals of change.
- ☒ **Virtualization.** Devices and connections are managed as pools of resources, shielding the administrator from the complexity of managing individual servers.
- ☒ **Lights-out, "1:n" administration.** Group management capabilities streamline processes and reduce management overhead.
- ☒ **Efficiency.** BladeSystem servers are less expensive to buy and own than conventional IT server infrastructures.

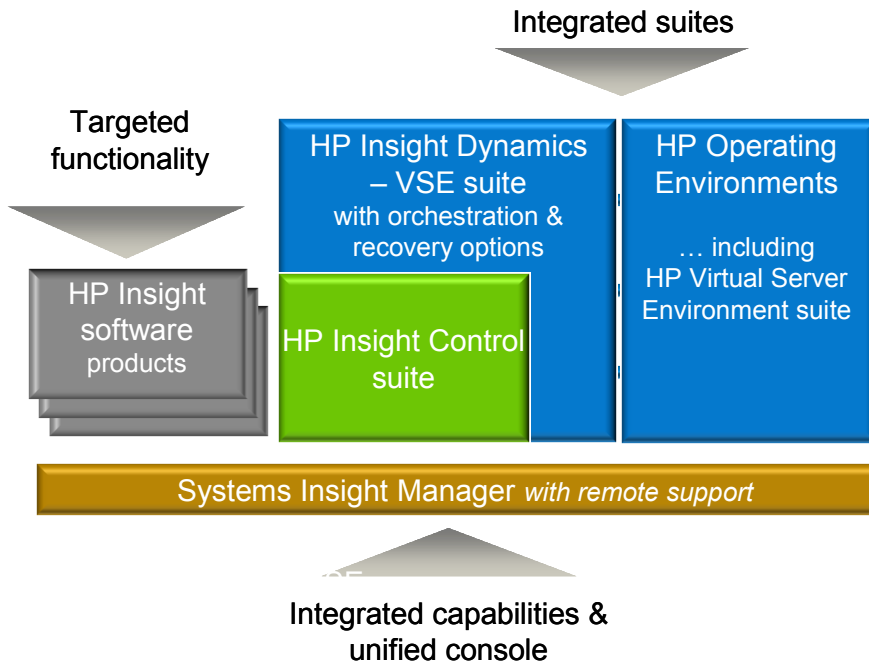
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## **HP Insight Software**

The HP Insight Software portfolio is designed to allow customers to continuously control and optimize their HP infrastructure across a variety of platforms, including BladeSystem, ProLiant, Integrity, and even storage. The foundation of the HP Insight Software portfolio is HP Systems Insight Manager, which provides a single, integrated view of all infrastructure resources and delivers core management services for discovery, monitoring, and control (see Figure 2). Built on top of that foundation are HP Insight Control Environment, a full-featured management tool that provides comprehensive provisioning, imaging, deployment, and monitoring, and HP Insight Dynamics – VSE, an integrated management platform that enables physical and virtual resources to be managed in exactly the same way. Critical enablers for HP Insight Software are HP Virtual Connect and HP Virtual Connect Enterprise Manager, which provide I/O virtualization technology used to scale across larger blade system environments. For additional detail and description of both HP Virtual Connect and HP Virtual Connect Enterprise Manager, please refer to the IDC technical brief *Next-Generation Technology for Virtual I/O and Blade Servers*.

**FIGURE 2**

The HP Insight Software Portfolio



Source: HP, 2009

***HP Insight Control Environment and HP Insight Control Environment for Linux***

Built on HP Systems Insight Manager, HP Insight Control Environment (ICE) and HP Insight Control Environment for Linux (ICE-LX) are integrated software suites that provide infrastructure management. HP ICE and HP ICE-LX are designed to address everyday datacenter administration tasks such as server deployment, server health monitoring, power management, and remote management.

HP ICE also provides performance management, vulnerability management, and virtual machine management for BladeSystem environments. When integrating HP and open source technology, HP ICE-LX becomes a full-featured management tool for companies that require a Linux-based central management console. Both tools provide deployment, power management, remote management, and system discovery and health monitoring capabilities. These software suites unify the management of servers, storage, power and cooling, and networked devices from a single console.

HP ICE and HP ICE-LX help differentiate HP BladeSystem offerings by making BladeSystem environments simpler and more seamless to manage. By taking advantage of intelligence built into the hardware platform, they can help simplify deployment and infrastructure life-cycle management, which in turn can increase system availability, create tangible datacenter efficiencies, and provide administrators with greater control.

## ***Infrastructure Management with HP Insight Control***

HP Insight Control is designed to provide system management capabilities across the entire IT life cycle (see Figure 3):

- ☒ **Deployment.** HP Insight Control provides automated deployment tools such as the HP Rapid Deployment Pack, which is intended to allow customers to configure systems once and deploy multiple times. It allows customers to do imaging, hardware and operating system configuration, security scanning, and patch application all from a single interface. HP Server Migration Pack is an optional upgrade and allows administrators to check the integrity of source and target servers and automate migrations of operating systems, applications, and data.
- ☒ **Monitoring.** HP Insight Control includes HP Systems Insight Manager, which enables administrators to monitor their infrastructure from a single console. They can keep an eye on system health, performance, workload functions, server utilization, and power usage, and they can monitor BladeSystem, StorageWorks, and Integrity infrastructures from the same console. HP Performance Management Pack, available exclusively with HP Insight Software, enables proactive management and response to configuration anomalies and performance issues.
- ☒ **Control.** With HP Integrated Lights-Out 2 Advanced (iLO 2), administrators can control their servers remotely from almost anywhere. It allows administrators to take control of systems from a central location to restart servers, control power settings, update software, and interact with the operating system remotely. It can be used to diagnose server problems, regardless of the server's geographical location. With a full graphic view of the server as well as automatic video recording and team collaboration capabilities, iLO 2 Advanced helps customers save on staff time and travel budgets.
- ☒ **Power management.** Power management is a critical aspect of monitoring and control. With Dynamic Power Capping, HP Insight Control can help companies measure, manage, and reduce the amount of power required by the servers in their datacenter. It enables companies to identify unused or "trapped" power capacity and to deploy servers to reclaim this capacity. Organizations can then set power caps at the server or BladeSystem enclosure level to ensure the infrastructure does not exceed the available energy budget, even at times of peak server load.
- ☒ **Security.** HP Vulnerability and Patch Management can help protect systems from vulnerabilities. It offers role-based security, along with automatic security patching, and can be used to proactively scan systems for operating system security vulnerabilities and apply necessary patches.
- ☒ **Optimization.** HP Virtual Machine Management Pack provides central management of virtual machines with physical host to virtual machine association; identification of virtual machines or host servers reaching high CPU, memory, or disk utilization levels; flexible move capabilities that allow live moves (for some platforms) and moves to dissimilar host resources; and backup, template, and alternate host capabilities that enable restoration of virtual machines on any available host. VMware, Microsoft, and Citrix are all currently supported.

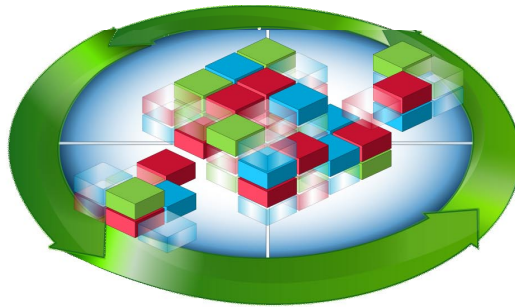
- ☒ **Integration.** Because it is built on HP Systems Insight Manager, HP Insight Control provides the ability to integrate systems with other enterprise tools to manage HP storage and server infrastructure from a single console. This includes application management, IT management, and business process management functions.

### FIGURE 3

HP Insight Software Offers End-to-End Infrastructure Management

**Deep insight**  
Make more informed decisions

**Precise control**  
Accomplish more in less time



**Ongoing optimization**  
Deliver better service to the business

Source: HP, 2009

#### ***Driving ROI with HP Insight Control***

In 2008, IDC interviewed IT staff members from 15 North American, European, and Asian companies to conduct an ROI analysis of the benefits associated with using HP Insight Control solutions. The analysis was conducted by looking at HP Insight Control solutions both individually and in combination as part of the HP Insight Control solution stack, including Rapid Deployment Pack, Integrated Lights-Out 2 Advanced remote management, Insight Power Manager, Virtual Machine Management, Performance Management Pack, and Vulnerability and Patch Management.

The benefits were found to improve as more solutions were added to the mix; the average three-year ROI for implementing a single product was 402%, while the average three-year ROI associated with implementing all products grew to 563%. Similarly, the benefit realized over three years per 100 users was \$24,085 for a single product, growing to \$48,380 for companies that implemented all products.

## ***HP Insight Dynamics – VSE***

HP Insight Dynamics – VSE is an integrated solution that allows datacenter administrators to continuously analyze and optimize their physical and virtual resources in their BladeSystem infrastructure in exactly the same way. It provides the ability to visualize, plan, and change physical and virtual resources and enables organizations to more easily introduce virtualization into their physical infrastructure. This can help organizations cut operational costs and adapt their infrastructure as their needs change or their business grows.

The latest management software offering from HP, HP Insight Dynamics – VSE includes and builds on key HP management software technologies, including HP Systems Insight Manager, HP Insight Control Environment, and HP Virtual Server Environment. It plugs seamlessly into HP Systems Insight Manager, HP's platform management tool, and extends the functionality found in HP Insight Control Environment by incorporating multiple new capabilities, such as:

- ☒ **Real-time capacity planning.** HP Insight Dynamics – VSE allows companies to continuously analyze and optimize server capacity and power use. Analyzing millions of historical data points, HP's Smart Solver technology can determine the best fit for an organization's workloads, reducing the number of physical servers needed. This can be a significant advance over traditional capacity planning approaches that rely on Excel and expert best guesses. HP Insight Capacity Advisor Consolidation software offers a six-month license of this capacity planning capability.
- ☒ **Physical and virtual resource balancing.** Using "logical servers" — server profiles that can be easily created and moved across physical and virtual machines — companies can balance resources on the fly to provide better performance and service levels to the business. These logical servers leverage the server I/O virtualization delivered by HP Virtual Connect that enables organizations to control physical and virtual resources in exactly the same way. It extends the capabilities of HP Systems Insight Manager to allow administrators to see all available resources on a single screen. It can also be extended to manage leading virtualization technologies from vendors including VMware and Microsoft.
- ☒ **Cost-effective availability.** With the ease of moving resources afforded by logical servers, businesses can achieve higher levels of availability and better quality of service more economically than with traditional clustering solutions. For example, creating and moving workloads as logical servers can shorten maintenance windows and enable more proactive maintenance. The HP Insight Recovery option, new in January 2009, provides data replication for metropolitan-distance data recovery. Companies can take advantage of logical server profiles to fail over to remote sites, automate the recovery of logical servers, and provide continuous access with the "push of a button."
- ☒ **Automated infrastructure provisioning.** Logical servers can be saved as templates and restarted at any time, streamlining deployment processes. The HP Insight Orchestration option, new in January 2009, automates the provisioning and repurposing of IT infrastructure. It provides a graphical environment that can

be used to visually design standardized infrastructure services that can be saved as templates and used to automate the provisioning of services into that environment. Templates can be developed for single virtual machines or complex multitiered architectures.

### **Benefits of HP Insight Dynamics – VSE**

HP Insight Dynamics – VSE can help companies tackle a number of challenging technology issues in new and innovative ways. Some of the uses for this software include:

- ☒ **Continuous consolidation.** HP Insight Dynamics – VSE enables organizations to optimize resources on a more continuous basis — instead of managing server consolidation in one-off, piecemeal projects — by simulating and identifying best-fit configurations based on different workloads and sets of server resources. It captures data every five minutes on resources such as CPU, memory, network, disk, and even power at the individual server level and works both for HP infrastructure and for any x86-based servers in the infrastructure. It allows ongoing rebalancing and repurposing of workloads, allows organizations to instantly see available infrastructure on which to deploy new workloads, and identifies servers that push their capacity limits and that could be rebalanced.
- ☒ **Energy-aware capacity planning.** HP Insight Dynamics – VSE provides the data and tools necessary to plan server capacity and power needs. It enables power usage planning for different scenarios and enables companies to see their best choices for provisioning and redeploying servers in an energy-efficient manner.
- ☒ **High availability.** Many organizations use complex, clustered configurations to provide high-availability failover capability to a handful of business-critical applications. By using HP Insight Dynamics – VSE to shift workloads to physical servers at alternative locations during periods of unplanned downtime, companies can bring "everyday" high availability to a broader range of applications, and with HP Insight Recovery, companies can implement cost-effective disaster recovery with automated failover to remote metropolitan-distance sites.
- ☒ **Dynamic infrastructure provisioning.** Configuring, testing, and troubleshooting applications in multitier environments can be cumbersome and time consuming. With the HP Insight Orchestration option for HP Insight Dynamics – VSE, organizations can visually design and automatically provision infrastructure environments from pools of resources.

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### **IDC Analysis**

IT managers can improve TCO by reducing management and administrative costs if given the tools to do so. IDC has been tracking server system sales into the datacenter for the past 40 years, yet it has been only in the past 10 years that we have seen almost linear growth in the installed server base. As discussed previously, IT trends during the past decade have helped customers reduce capital expenditures, but the downside has been a significant growth in the "hidden" cost of IT, namely the

spending on staff to maintain the growing server installed base. IDC estimates this expense has been growing at eight times the cost of server spend. IT organizations cannot continue to operate under this model if they are expected to provide increased capacity and demonstrate higher service levels to meet tighter regulatory control requirements.

Mainstream adoption of server virtualization has introduced customers to new usage models for servers. By leveraging tools that allow administrators to move virtual servers across different physical servers, organizations can increase availability and reduce planned and unplanned downtime. Ironically, one of the new challenges in these virtual environments is an outgrowth of the very ease with which and speed at which virtual servers can be deployed. IDC estimates that by 2011, there will be almost as many virtual servers deployed as physical servers. This "virtual server sprawl" puts additional pressure on IT staff as all of these logical servers, both virtual and physical, must be administered in the same manner. Management and automation tools, along with the adoption of better governance practices and policies within each individual organization, will be fundamental to the continued success of this market.

With HP Insight Software, HP has delivered a holistic blade administration solution within a single package, one that automates key management functions and reduces key pain points discovered while working with customers. HP Insight Software can reduce the time required for infrastructure management while increasing overall flexibility. As a result, IT managers can improve their overall productivity and staff satisfaction by shifting resources from performing mundane maintenance operations to focusing on datacenter enhancements and revenue-generating activities.

However, key barriers to the widespread adoption of blades still exist at the blade management level, including integration of modules, providing a common graphical user interface (GUI), and cross-vendor management support.

### ***Integration of Modules***

Building a comprehensive management tool for today's complex datacenter IT infrastructure is a daunting task. HP Insight Software provides a broad range of management capabilities; however, to drive even greater value to IT administrators, HP can continue to differentiate by providing deeper integration with a broader range of IT management control tools, both from HP and other vendors. HP has made a good start by enabling HP Systems Insight Manager to launch third-party tools in context from within the HP Systems Insight Manager menu. Additional third-party integrations could include standard business applications such as Exchange, business activity monitoring (BAM) products, analytics and reporting tools, and service-level agreement (SLA) management systems.

### ***Common Graphical User Interface***

With the proliferation of management tools and consoles, users must become adept at a variety of different GUIs. The ability to standardize on a common GUI vocabulary across multiple different administrative tools and consoles will prove to be a great step forward in usability for end users. HP has taken steps toward this with the implementation of its "One Voice" GUI standards within the management tools.

This initiative provides a consistent look, feel, and flow across multiple different tools. An example of its use can be seen in the integration of the Onboard Administrator GUI into HP Systems Insight Manager. Administrators can move from setting up enclosures, to in-depth drilldown on server-blade details, to management of their broader server and storage environment.

### ***Cross-Vendor Management Support***

The perceived lack of standards in cross-functional infrastructure management makes it challenging for HP Insight Software to provide management capabilities across non-HP products; however, most organizations have a heterogeneous technology infrastructure consisting of products from many disparate vendors. HP Systems Insight Manager supports management of third-party devices through industry-standard protocols such as SNMP and WBEM. But some challenges do arise in the management of blade infrastructures where standards continue to evolve. HP Insight Software, therefore, does not provide the in-depth management and association of competitors' blade infrastructures, although it can manage the blade servers as independent devices. To solve a broader range of IT organizations' needs, HP has an opportunity to continue to evolve HP Insight Software to interoperate with a broad range of different vendors' infrastructure products.

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## **Conclusion**

As the next generation of HP blade server architecture and technology, the BladeSystem c-Class can help datacenter administrators reduce their overall server management complexity, respond more efficiently to change, and improve ROI. Key differentiators for the BladeSystem c-Class portfolio include integrated technologies such as HP Virtual Connect and HP Thermal Logic, plus HP Insight Software, a suite of management tools designed to enable simple and reliable provisioning, monitoring, and control of the BladeSystem infrastructure.

By incorporating HP Insight Software into future infrastructure deployments, customers will be able to deliver automation for key management processes. This will enable customers to perform more work in less time, ensuring that IT talent is focused on proactively responding to business needs instead of supporting time-consuming manual processes, and, as a result, drive improved ROI metrics.

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