

# Remote Management Strategy

technology brief, 2<sup>nd</sup> edition



Abstract.....	2
Introduction.....	2
HP Systems Insight Manager .....	2
Management Agents .....	4
ProLiant Essentials Performance Management Pack .....	6
Lights-Out Technology .....	7
Hardware-based Graphical Remote Console .....	7
Security.....	7
KVM Reduction .....	8
Virtual Floppy Drive.....	9
Virtual Power Switch Support.....	9
Lights-Out Configuration Utility.....	10
Rapid Deployment Pack.....	11
SmartStart Scripting Toolkit.....	11
Remote Deployment Utility .....	11
Remote Cluster Management.....	12
Cluster Monitor .....	12
Security .....	13
Future Development.....	13
Conclusion.....	14
For more information.....	15
Call to action .....	15

## Abstract

As companies globalize and industry-standard servers proliferate, it becomes impractical to administer every server locally. As demands for efficiency and responsiveness increase, remote system management becomes critical, even in data centers with onsite administrators. HP aggressively develops powerful remote management technologies to give IT administrators around-the-clock access and control of ProLiant servers and ProLiant server clusters located anywhere. This paper describes key HP technologies that provide industry-leading remote management solutions.

## Introduction

In today's dynamic marketplace, cost-efficient, reliable Information Technology (IT) operations are an absolute requirement for successful business operations. Reliable remote management is becoming essential for two important reasons. First, geographically distributed networks typically include systems in locations where no local system administrator is available. The cost in time, dollars, IT resources, and possible system down time for dispatching administrators to remote sites is prohibitive. Second, remote management used within data centers allows administrators to maximize the efficiency of the IT resources at their disposal. By allowing IT staff to manage systems from their desktops instead of making numerous trips into the data center, remote management tools enable rapid resolution of issues, enhance the physical security of the data center, and reduce costs for monitors, keyboards, mice, and switch boxes.

HP develops technologies to unify and simplify IT infrastructure management so that customers can focus their skilled IT resources on business issues instead of infrastructure management. HP's strategy for providing industry-leading remote management is to enable "virtual presence" across the entire HP ProLiant server family. ProLiant servers are the industry's most stable and reliable industry-standard hardware platforms. Virtual presence gives system administrators immediate, around-the-clock access and control of ProLiant servers and ProLiant server clusters located anywhere.

The cornerstone of HP's strategy is web-based management. HP develops a full complement of technologies to provide efficient, reliable management of devices from any network access point. This paper describes the technologies used in HP's remote management solutions.

## HP Systems Insight Manager

HP Systems Insight Manager is HP's next-generation web-based enterprise management console. The core Systems Insight Manager software delivers the essential capabilities to manage all HP server platforms. Systems Insight Manager can also be extended to deliver an unparalleled breadth of device management with plug-ins for HP clients, storage, power, and printer products. Plug-ins for rapid deployment, performance management, partition management, and workload management allow systems administrators to pick the value added software required to deliver complete lifecycle management of their hardware assets.

HP Systems Insight Manager brings together in one location all fault, performance, and management information about the IT infrastructure (Figure 1). By integrating current enterprise management technology with the latest advances in web technology, it enables IT administrators to monitor and manage groups of servers, clients, clusters, and networking products from a standard web browser. HP Systems Insight Manager is capable of discovering and managing devices from HP and other vendors using SNMP, DMI, and HTTP. It 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.

HP Systems Insight Manager uses a SQL database (either Microsoft SQL Server or Microsoft Data Engine) as the back-end store for management data. HP Systems Insight Manager can be configured to collect single instance and historical performance, configuration, and fault data.

An important feature of HP Systems Insight Manager is that it allows IT administrators to perform queries against the SQL database to view, on demand, status information about specific devices or information about specific types of events (Figure 2). Administrators can also modify how HP Systems Insight Manager operates, based on how their network is physically laid out. For example, because latency is a significant factor for systems located on the opposite side of a satellite link, those systems should be managed differently from systems located nearby. Administrators can instruct HP Systems Insight Manager to poll specific devices on the network at different intervals according to their physical location and the latency of the connections.

Figure 1. Opening display of HP Systems Insight Manager.

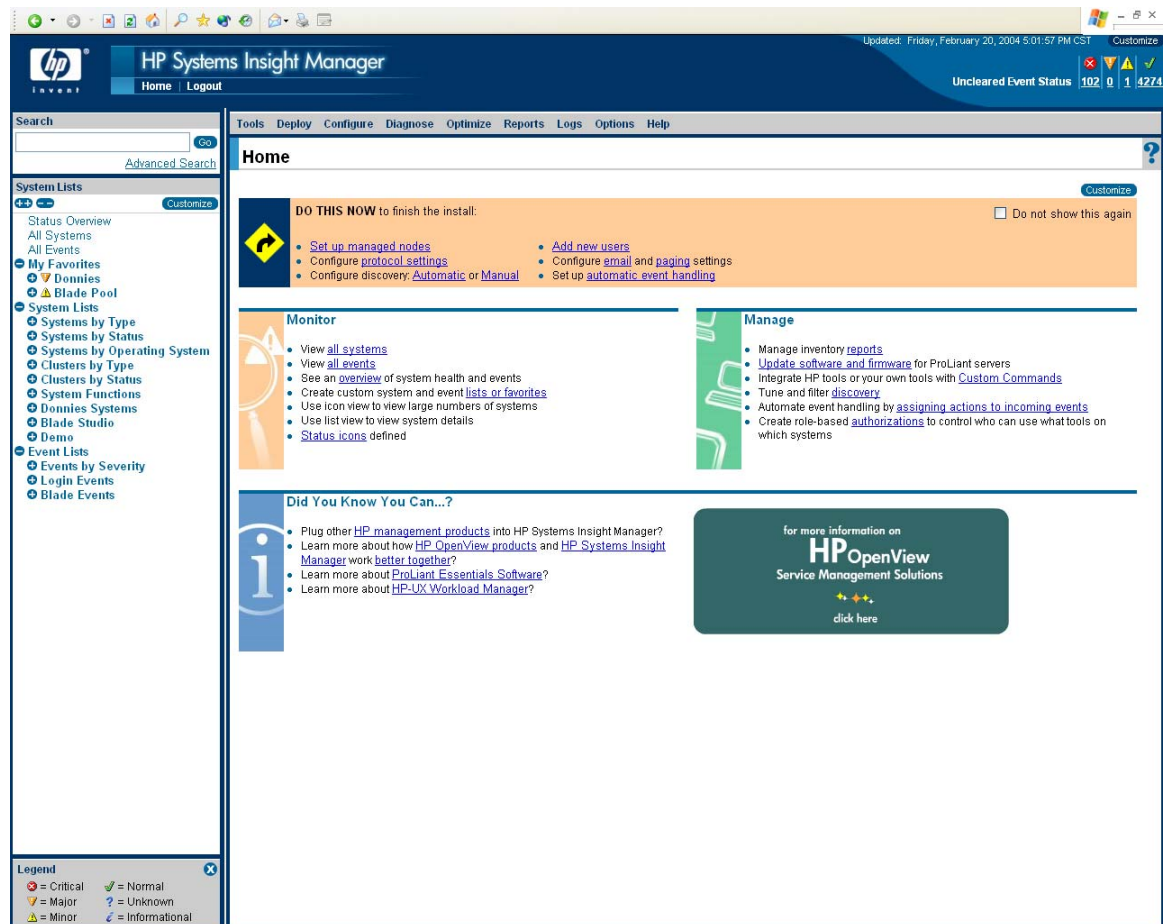
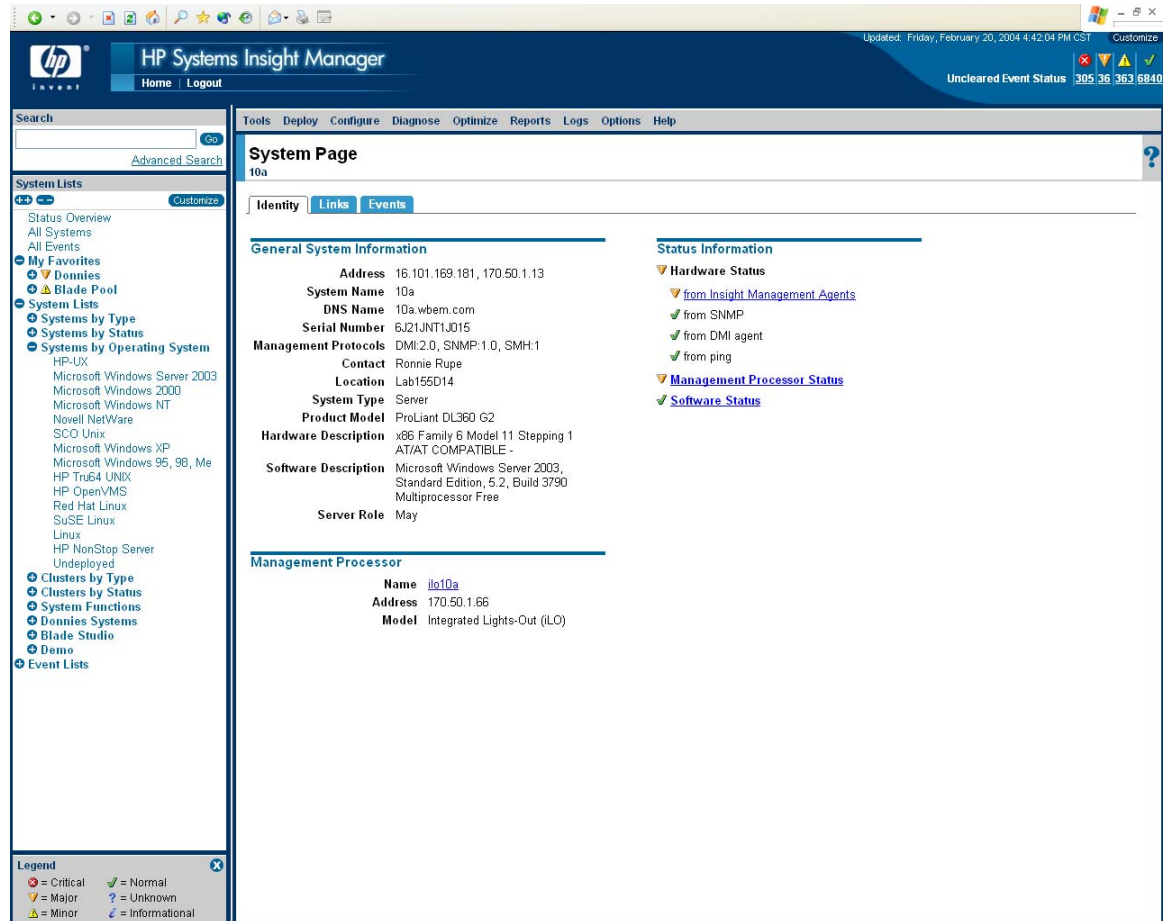


Figure 2. IT administrators can query the HP Systems Insight Manager database for device status.



HP Systems Insight Manager also enables administrators to define what kinds of notification they want to receive, based on the physical layout of the network, the functionality of devices (say database servers versus file and print servers), or whatever scheme they choose. For example, although IT administrators may want to be paged or notified personally of all alerts on systems in the data center, they may want alerts about remote servers to go to someone else, perhaps to a service provider.

HP Systems Insight Manager can manage up to 5,000 devices and 50,000 events. While this is more than adequate for many companies, others may require the ability to manage even more devices. For this reason, HP has ensured that HP Systems Insight Manager and the HP Management Agents integrate with leading management platforms such as CA Unicenter, NetIQ App Manager, Tivoli Enterprise, and HP OpenView. In this way IT administrators can leverage HP Systems Insight Manager to manage HP servers and integrate this information into other management tools as necessary.

HP Systems Insight Manager is available for download from [www.hp.com/go/hpsim](http://www.hp.com/go/hpsim).

## Management Agents

HP web-enabled Management Agents are the key architectural piece of the HP remote management strategy. They provide direct access to in-depth instrumentation built into HP servers, workstations, desktops, and portables. Once installed on a network device, these software components read the device's instrumentation, evaluate it, and use industry-standard protocols to report device status or to transmit system alerts to a management console such as HP Systems Insight Manager.

HP Management Agents for systems running Microsoft Windows Server 2003, Windows 2000 or Windows NT, Novell NetWare, Linux, SCO UnixWare, UnixWare 7, or SCO OpenServer 5 operating systems are available for download from [www.hp.com/support/files/](http://www.hp.com/support/files/).

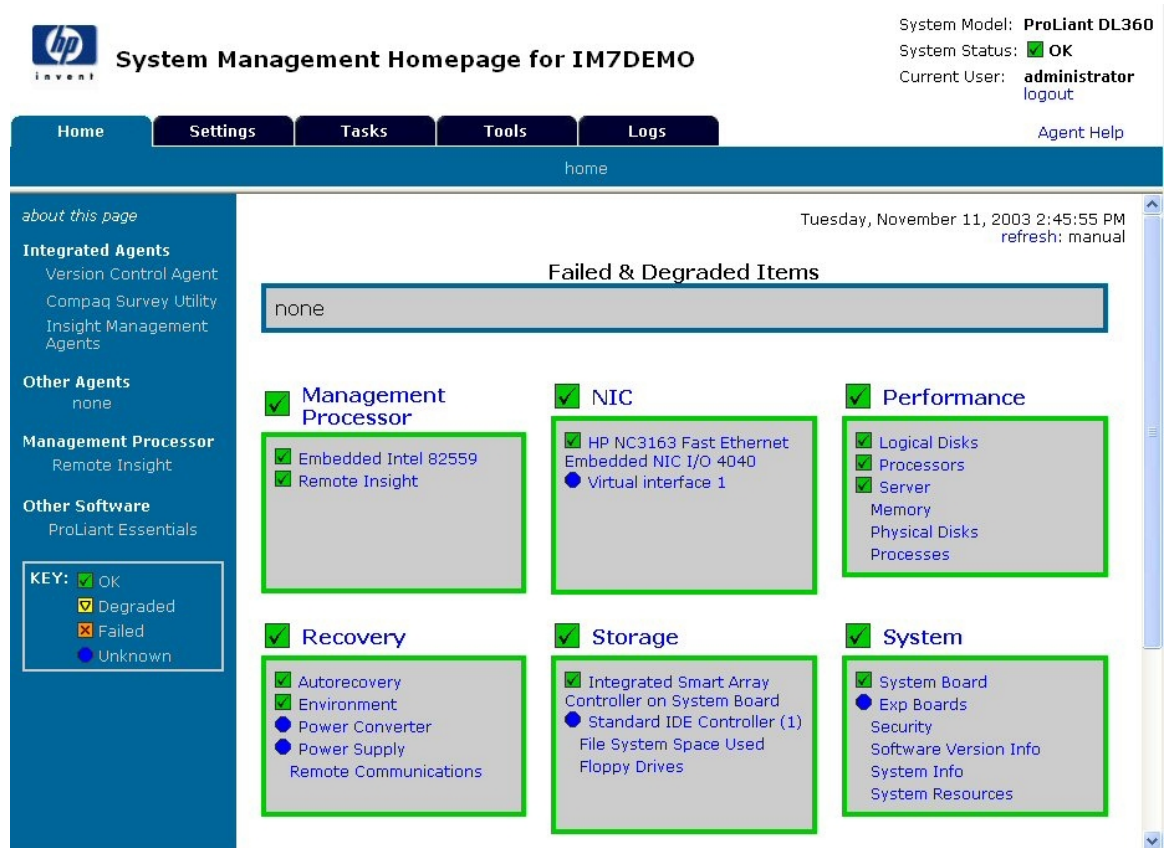
HP has also developed Management Agents for the Tru64 and Open VMS operating systems and is currently developing web-enabled Management Agents to support industry-standard 64-bit computing. While the server and OS are running, these agents provide the means for monitoring and tuning performance and for reconfiguring and reallocating system resources. They reduce down time by providing predictive fault management.

HP Management Agents monitor more than 1,000 parameters on system and subsystem elements such as disk, CPU, memory, fans, and temperature. They maintain an aggregate systems status for the device, which is collected regularly by management consoles such as HP Systems Insight Manager. In the event of subsystem failures or abnormal instrumentation readings, these agents initiate alerts to the management console. Parameter monitoring and alerting by HP Management Agents combined with the trend analysis capabilities of HP Systems Insight Manager actually predict impending component failures. Thus, these agents form the foundation for HP's Pre-Failure Warranty program. If the HP Management Agents detect problems that require replacement of a disk, CPU, or memory within the server's warranty period, HP will replace these components free of charge. The combination of the HP management agents and the HP Pre-Failure Warranty program helps system administrators prevent unnecessary downtime by providing advance notice of potential server failures and by facilitating rapid and proactive replacement of failing parts.

HP Management Agents work with Simple Network Management Protocol (SNMP), a widely used industry-standard management protocol. SNMP uses both standard and extended Management Information Bases (MIBs) to define the types of information that can be retrieved from a device. HP makes its MIBs freely available to enable integration of HP Management Agents with a wide variety of management platforms.

HP Management Agents are accessible directly through a standard web browser (Figure 3), through HP Systems Insight Manager, or through systems management applications developed by other vendors. With the Management Agents, comes a HP HTTP server viewable using a standard web browser through port 2301. From the System Management Homepage on this HTTP server, IT administrators have access to all web-enabled HP management software active on the HP device. The HTTP server allows administrators to view system status and to manage their systems from anywhere using a standard web browser.

Figure 3. HP Management Agents are accessible directly from a HP HTTP server through a standard web browser.



## ProLiant Essentials Performance Management Pack

ProLiant Essentials Performance Management Pack (PMP) is a software solution that detects, analyzes, and explains hardware bottlenecks on HP ProLiant servers. PMP provides the tools needed to receive proactive notification of building bottleneck conditions, and to debug existing performance issues. The PMP software monitors performance on one or more servers. The performance information is analyzed to determine if there is a building or existing performance bottleneck issue. You can interactively display this information, log the information to a database for later analysis or reporting, and set up proactive notification using the HP Systems Insight Manager notification mechanism.

Performance Management Pack is installed on the same server as the HP Systems Insight Manager console. There is no software required on the monitored server, other than the management agents required for HP system's usage. There is no software required on the client machine used to view the information, other than a browser.

The Performance Management Pack software allows for production management and alerting, historical analyses of performance, verification of pilot projects, and identification of consolidation opportunities.

# Lights-Out Technology

With the introduction of the HP Remote Insight Lights-Out Edition II and Integrated Lights-Out, HP offers customers the means of extending remote server management far beyond traditional emergency response. Remote Insight Lights-Out Edition II is an autonomous internet appliance with an on-board processor, memory, NIC, and ROM; and it is tightly integrated with HP Systems Insight Manager for collecting management information and issuing alerts. It enables IT administrators to be virtually present at a HP ProLiant server, as though they were actually standing in front of it.

Lights-Out technology gives IT administrators the ability to control a Lights-Out enabled system from anywhere at any time through a standard web browser, regardless of the condition of the OS and the system itself. If a server or the network OS fails, an administrator can still have management access to the Lights-Out enabled system using a web browser.

Using Lights-Out technology, IT administrators can manage ProLiant servers remotely through all their life cycles: initial deployment, operation, redeployments, and end of server life. Administrators can access servers in data centers and at remote sites from their desktops using a client web browser on a standard TCP/IP connection. Roaming administrators can access Lights-Out enabled servers in multiple ways: using a wireless-equipped laptop in the vicinity of a wireless access point or using a modem-equipped laptop to dial in to a remote access server (RAS), to an external modem router attached to the local area network (LAN), or to a virtual private network (VPN).

This section describes how Lights-Out technology provides this management functionality and HP's ongoing efforts to enhance it.

## Hardware-based Graphical Remote Console

Lights-Out technology allows around-the-clock control of ProLiant servers through a seamless, hardware-based graphical remote console (Figure 4). The host server console is redirected by hardware to a remote client over the LAN to provide the administrator full text and graphical mode video, keyboard, and mouse access through a standard web browser. Since this functionality is hardware based and OS independent, it uses no host server CPU cycles and requires no special drivers or emulation software for the operating system.

The graphical remote console capability turns the client browser into a virtual desktop, regardless of which OS the host server is running or what state the hardware is in. It enables administrators to reboot the server remotely to recover from OS lockups and provides access to vital troubleshooting information when the OS is down. An external power adapter plugged into the Remote Insight Lights-Out Edition II board allows remote management access even if the server is powered down. This capability gives administrators the ability to access the server, perform diagnostics, reset the system, watch the reset process remotely, and view Automatic Server Reset sequences even if the OS is offline. With the exception of a standard client web browser, no additional software is required for this functionality.

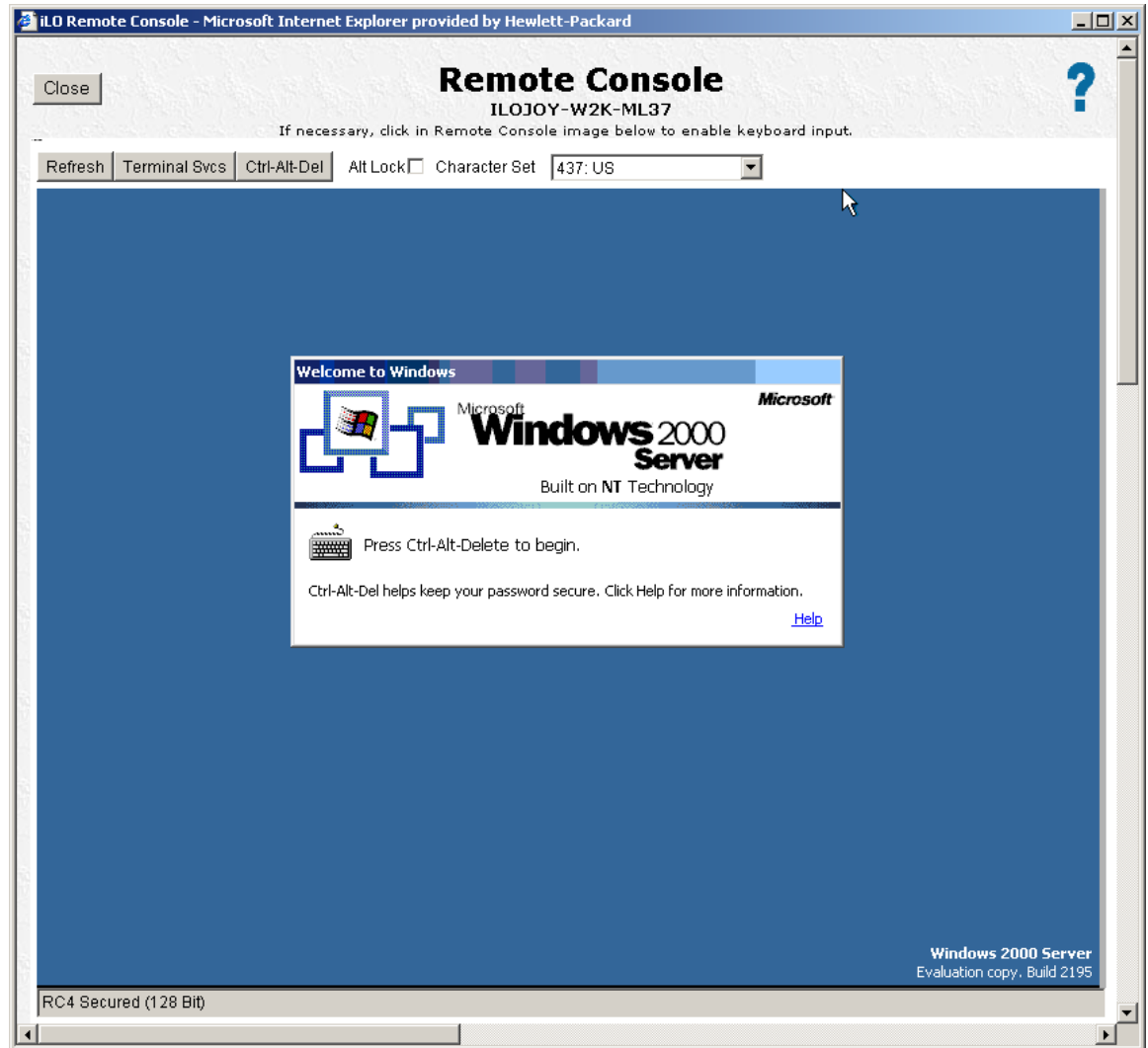
## Security

Remote Insight Lights-Out Edition II provides security for remote management in distributed IT environments by using the industry-standard Secure Sockets Layer (SSL) protocol to encrypt HTTP data. SSL encryption ensures that all HTTP data traveling across the network during an active Remote Insight session is secure. All Remote Insight Lights-Out Edition II boards now ship with 128-bit SSL encryption enabled.

Although Remote Insight Lights-Out Edition II can be coupled to a customer's corporate network, for increased security HP designed in the capability to physically separate the management network from the corporate operations network. At the back of each ProLiant server are two network jacks, one for corporate network transmissions and a second jack that can be used for management transmissions.



Figure 4. The graphical remote console of Integrated Lights-Out.



Lights-Out technology also provides encrypted password protection, event generation for invalid login attempts, and optional protection for the HP ROM Configuration Utility. A Remote Insight Lights-Out Edition II board can be configured for up to 25 users who have one of the following access rights levels:

- Administer User Accounts
- Remote Reset/Virtual Power Button
- Remote Console Access
- Virtual Media Access
- Configure Setting

## KVM Reduction

Remote Insight Lights-Out technology enables customers to make optimum use of data center space and to simplify cable management by deploying racks full of servers without the keyboard, mouse,



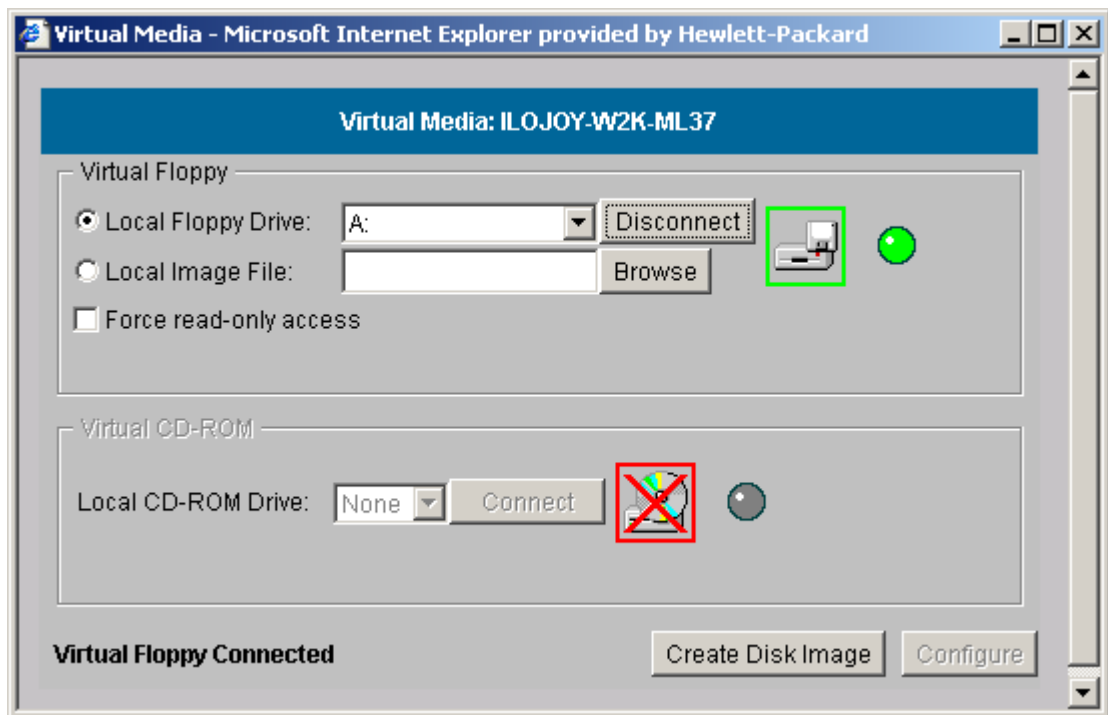
monitor, and switchbox traditionally needed for local server access. For Lights-Out enabled servers, all server management functions can be performed remotely using the graphical remote console.

Deploying servers without a keyboard, mouse, and monitor increases server density in rack environments, significantly improves cable management by reducing the number of required cables, and reduces hardware costs; all without sacrificing convenience or functionality. It consolidates the bulky video cable, keyboard cable, and mouse cable into one Ethernet cable. This cable consolidation allows, for example, deployment of up to 42 ProLiant DL360 servers in a single, standard 42U rack.

## Virtual Floppy Drive

HP is developing new technology to support not only server consolidation, but also consolidation of server components, so that each server deployed need not be populated with all components. For example, Remote Insight Lights-Out Edition II now provides virtual floppy and virtual CD drive functionality (Figure 5). Host servers without physical floppy drives can boot from a floppy diskette image pushed to the server from the browser. This technology enables remote installation of the OS, drivers, and ROM updates; and with the exception of a standard client web browser and the HP Diskette Image Utility, no additional software is required for this functionality. When paired with the HP SmartStart Scripting Toolkit, the virtual floppy drive technology allows unattended installation of servers. All this functionality is reserved, of course, for personnel with appropriate access rights.

Figure 5. Virtual Floppy and Virtual CD Drive functionality provided by HP Lights-Out technology enables remote installation of operating system, drivers, and ROM updates.

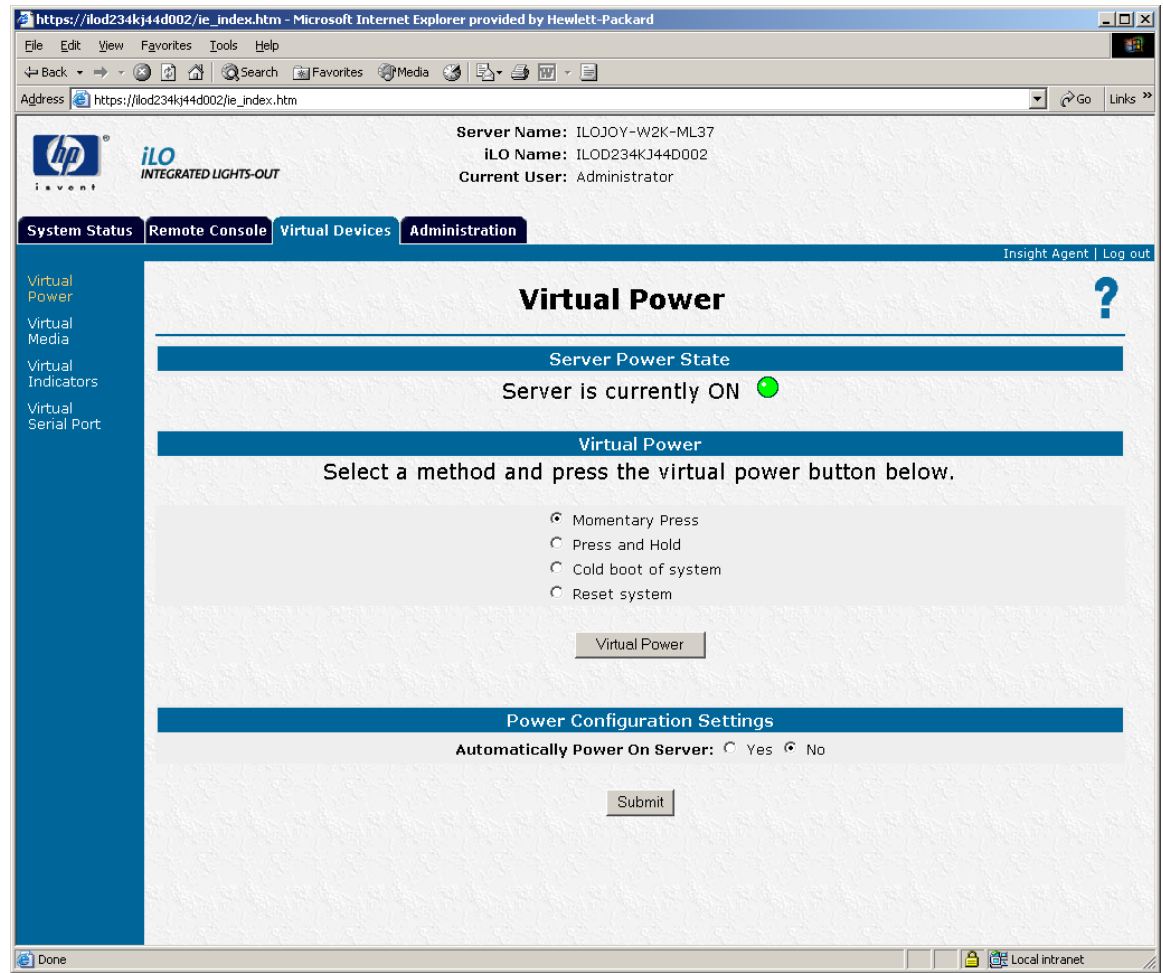


## Virtual Power Switch Support

Lights-Out technology also supports virtual power switch functionality for users with appropriate rights. Administrators can control power to a server remotely from a web browser (Figure 6). For example, using the virtual power switch, an administrator can power up a newly deployed server for the first

time and can force a power cycle of a "hung" server. If a power outage or other anomaly occurs at a remote site, an administrator can power down one or more servers there and power them back up as needed.

Figure 6. With HP Lights-Out functionality, administrators can control power to a server remotely.



## Lights-Out Configuration Utility

HP provides a Lights-Out Configuration Utility based on XML scripting. This utility simplifies the task of configuring and managing user accounts on Remote Insight Lights-Out Edition II boards and on Integrated Lights-Out. Using this utility with HP Systems Insight Manager, an administrator can easily add a new user, delete an existing user, and update user configuration information for a group of Remote Insight Lights-Out Edition II boards, rather than for only one board at a time.

Using HP Systems Insight Manager, an IT administrator can set up an application launch task to start the Lights-Out Configuration Utility on all Remote Insight Lights-Out Edition II boards listed on the HP Systems Insight Manager device query page. The application launch can be executed on demand or can be scheduled to run automatically at a specific date and time. A log of results is generated when the application launch task is completed.

XML-based remote scripting is a powerful tool available to Remote Insight Lights-Out Edition II users as a free ROM upgrade. With this tool, administrators can write scripts to remotely perform a multitude of operations on many servers. For example, an administrator can write a script for remotely

upgrading the system BIOS in a rack full of ProLiant DL360 servers. The script might instruct the Remote Insight Lights-Out Edition II in each server to do the following: power down the server, download the new BIOS, and then power up the server. With XML-based remote scripting capabilities, every function or task an administrator can do using Lights-Out technology and a web browser can also be done in a secure environment through an XML script running at a remote site.

## Rapid Deployment Pack

The ProLiant Essentials Rapid Deployment Pack is an integrated HP and Altiris solution that automates the process of deploying and provisioning server software, enabling companies to quickly and easily adapt to changing business demands. The Rapid Deployment Pack combines an off-the shelf version of Altiris eXpress Deployment Solution and the ProLiant Integration Module. The ProLiant Integration Module consists of software optimizations for ProLiant servers which include the SmartStart Scripting Toolkit, Configuration Events for industry standard leading operating systems, sample unattended files, and ProLiant Support Packs that include software drivers, management agents, and important documentation. Altiris eXpress Deployment Solution provides a management console that has an intuitive GUI that makes deploying a single server or multiple servers as easy as dragging and dropping events to servers. Deploying servers can be done through Altiris' imaging feature or scripting using the SmartStart Scripting Toolkit.

### SmartStart Scripting Toolkit

As businesses are faced with the need to deploy thousands of servers in a quick and reliable fashion, the SmartStart Scripting Toolkit simplifies high volume server deployment by delivering hands off, unattended installation and configuration.

The SmartStart Scripting Toolkit includes a modular set of DOS-based utilities for automating many steps in the server configuration process, which reduces the time required for deploying each server and makes it possible to scale server deployments to high volumes rapidly. These utilities enable administrators to create a configuration script, or server profile, for PXE-enabled target servers by copying and editing files of a configured source server. Administrators can then copy that configuration script and Toolkit utilities to a network share or a bootable server configuration diskette.

The server profile consists of four configuration files: a server hardware script file, a disk array script file, a partition script file, and a text file containing information for unattended OS installation. The latter is defined by the OS installation process. These four files become the basis for a server batch file (created using any ASCII text editor) to be run on target servers to configure and set up the server hardware and to install the server OS remotely.

With the SmartStart Scripting Toolkit and the virtual floppy feature of Remote Insight Lights-Out Edition II, deploying many servers becomes a quick, remote process for IT administrators. Once the servers have been installed in racks and network cables have been connected, an administrator can use the virtual floppy drive functionality to power up and boot the servers from the floppy diskette image, run the server configuration scripts, and launch the OS installation across the network. By combining scripts for server configuration and OS installation, IT administrators can rapidly configure a new server and install the OS remotely. This remote process shrinks a typical installation time from hours or days to minutes.

The SmartStart Scripting Toolkit supports HP ProLiant ML/DL 300, 500, 700 and BL servers. It is available for download from [www.hp.com/servers/sstoolkit](http://www.hp.com/servers/sstoolkit).

## Remote Deployment Utility

The HP Remote Deployment Utility (RDU) is an application that simplifies the process of updating software and lowers the overall cost of system software maintenance. It enables IT administrators to deploy HP driver and agent updates remotely from a central software repository to network-attached

servers running Windows Server 2003, Windows 2000 or Windows NT 4.0. In addition to a graphical user interface, the Remote Deployment Utility Console is a command line interface that allows administrators to script remote installation of HP software components.

IT administrators can operate the RDU from their workstations. The RDU enables administrators to browse a network directory or central software repository for a particular version of a HP Support Pack. In most corporate IT environments, a specific version is designated the standard for maintaining consistent server software configurations. The RDU also enables administrators to view servers on the network, to select a server for a deployment, and to deploy the software on the server by simply clicking on the server in the Windows network neighborhood view.

The RDU saves administrator time by eliminating the need to physically attend the server to install software updates. Because software updates are deployed from a central repository, the RDU also facilitates consistent server configurations. After each deployment, the RDU generates a log file that provides convenient administrator access to the software installation history for the server. This feature is particularly important when updating a server at a remote site. The RDU enables administrators to pull up a view of the log file and review whether the Support Pack installation was completed successfully. The log file is stored at the target system. It records all software installations by date and time; thus, it supplies the decision support information about the changes from one revision of software to the next. New revisions of driver and management updates contain details of critical fixes or new features added.

## Remote Cluster Management

Businesses deploy server clusters because high availability of their data and computing resources is of critical importance. Clusters meet customer needs for availability and scalability, but they bring increased complexity and added cost.

HP is committed to developing and supporting a sophisticated distributed cluster management environment for its enterprise-class distributed systems. With the largest installed base of Microsoft Clusters, a large professional base of cluster knowledge, and the highest percentage of cluster technology workers in the world, HP is uniquely equipped to do that. HP is consolidating management of servers and clustered systems through web-enabled management and the integration of cluster administration technology into HP Systems Insight Manager.

### Cluster Monitor

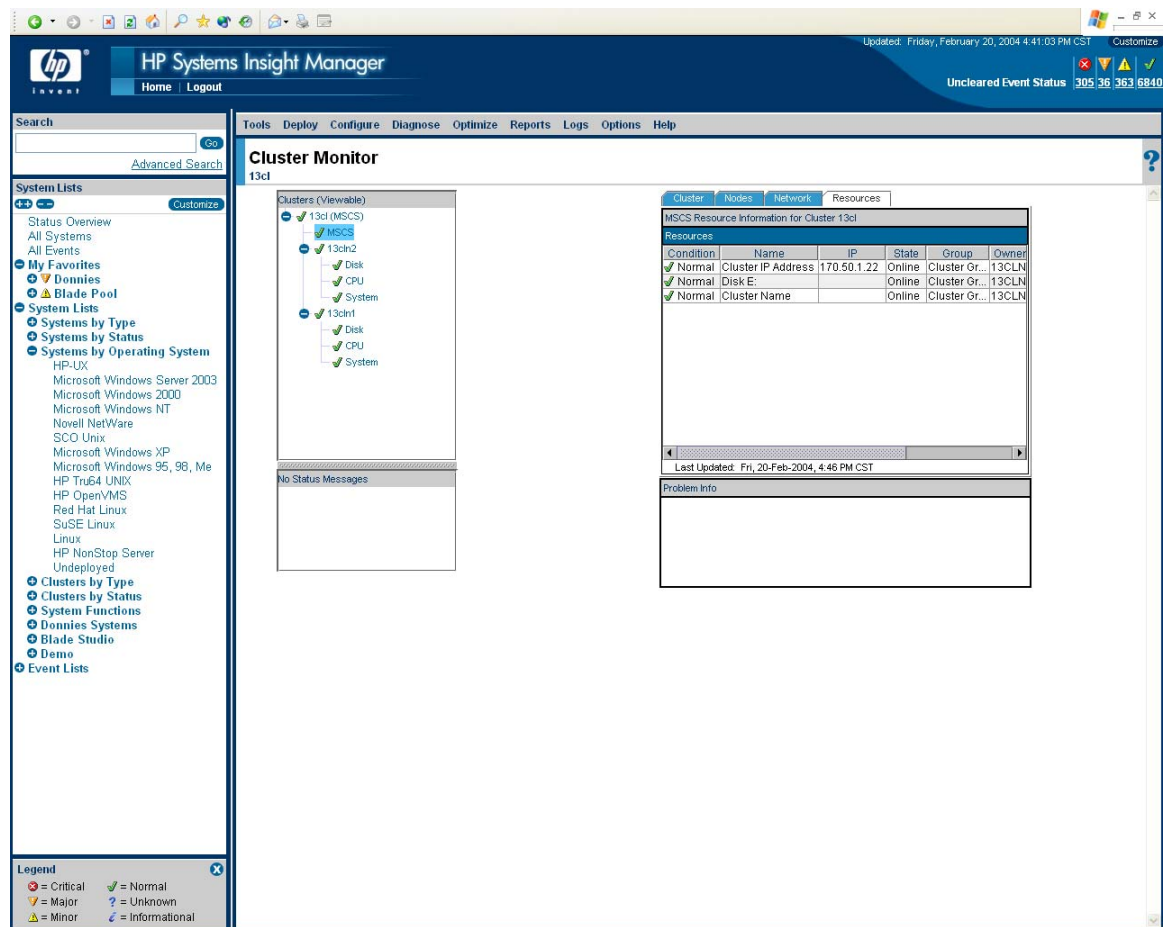
HP Cluster Monitor, a subsystem of HP Systems Insight Manager, is a complementary application. Cluster Monitor uses a standard web browser as the user interface to display real-time cluster monitoring information and provide IT administrators easy access anytime from anywhere on the Intranet. This allows administrators to react quickly to potentially destabilizing cluster events (Figure 7).

Cluster Monitor uses industry-standard HP Management Agents to obtain status information about cluster nodes. It also provides cluster resources for monitoring status checkpoints designed specifically for clustered systems. For example, it monitors cluster resources for cluster disk capacity and utilization, processor utilization, and cluster manager health. This cluster resource allows for adding new monitor points and for integrating products from HP partners into this application. HP Systems Insight Manager generates notifications for events detected by Cluster Monitor.

Cluster Monitor allows IT administrators to customize polling rates and views of clusters so they can monitor business critical applications in different ways from standard servers. Cluster Monitor displays event problem definitions and recommended corrective actions for problem events. If a potentially destabilizing cluster event happens, Cluster Monitor gives administrators an early warning and an opportunity to correct the problem before a catastrophic cluster failure occurs.

Cluster Monitor supports Microsoft Windows, Open VMS, Novell Netware, Oracle 9iRAC and Tru64 Unix clusters.

Figure 7. HP Cluster Monitor provides real-time event monitoring and displays cluster status.



## Security

Security is a key concern for IT administrators. Although managing security infrastructure is the responsibility of each customer, HP takes the security needs of customers very seriously and designs all of its products with a basic security subsystem.

HP remote management tools provide IT administrators secure access to their servers, from anywhere and anytime. HP management solutions provide the ability to assign user accounts and security passwords. Passwords are encrypted, not sent over the network in clear text; and invalid log-in attempts generate events. HTTP data is SSL encrypted before transmission over the network.

## Future Development

HP believes that providing a comprehensive, integrated remote management solution is vital for reducing the complexity and cost of IT infrastructure management and for helping HP customers to better serve their own customers. While striving to simplify IT architecture, HP is committed to improving and integrating its management software to simplify configuration and deployment, fault

administration, change management, and performance tuning and load balancing. In fact, HP's strategy for remote management is to eliminate any advantage to local server administration.

Toward that end, customers can expect future enhancements like these from HP:

- Tighter integration of management technologies
- Enhanced security to management products
- Lights-Out technology that is more accessible, more secure, faster, and easier to use
- A move to a more scalable solution for the Remote Insight user database
- Improved support for volume configuration
- Integration of software change management
- Expanded virtual media support

## Conclusion

HP is a leader in providing remote management for industry-standard servers and ProLiant server clusters. For example, HP engineers continue to do pioneering work on Lights-Out technology with the goal of expanding and integrating that technology into all ProLiant servers.

All of the HP management tools described in this paper work together to provide high availability solutions. By engineering ProLiant servers from the top to the bottom, HP provides customers functionality and value unmatched by other vendors. For example, unlike most other system vendors, HP develops its own management ASICs tailored to HP hardware and has a history of evolutionary development of system management ASICs. Expertise in video enables HP to provide hardware-based graphics images. By writing its own ROM, HP can make virtual floppy functionality available to a server before the OS is even loaded. By enabling virtual presence, HP is eliminating the need for local system administration so that customer IT groups can operate more efficiently and productively.

HP remote management solutions are web-enabled from the bottom up. Therefore, basic integration with other software products is practically automatic; a significant benefit to customers and other vendors alike. Teams of HP engineers are now developing exciting new web-enabled technologies that will expand the functionality of HP remote management solutions even further.

## For more information

**Table 1.** Web resources

Resource description	Web address
HP Systems Insight Manager	<a href="http://www.hp.com/go/hpsim">www.hp.com/go/hpsim</a>
Performance Management Pack	<a href="http://www.hp.com/products/pmp">www.hp.com/products/pmp</a>
Remote Insight Lights-Out Edition II	<a href="http://www.hp.com/servers/ilo">www.hp.com/servers/ilo</a>
Rapid Deployment Pack	<a href="http://www.hp.com/servers/rdp">www.hp.com/servers/rdp</a>

## Call to action

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

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