

# Managing the HP BladeSystem c-Class

technology brief



Abstract.....	2
HP Onboard Administrator for BladeSystem c-Class .....	2
Configuration logic .....	3
Thermal Logic management.....	4
Power Logic management .....	5
Enclosure bay IP addressing .....	7
HP Virtual Connect architecture.....	7
HP BladeSystem c-Class Insight Display.....	8
HP Insight Control Management Data Center Edition .....	13
Graphical BladeSystem c-Class Discovery, Monitoring and Administration.....	14
Performance Management and Bottleneck Analysis.....	14
Consolidated Vulnerability and Patch Management.....	15
Deploy OS, virtualization layer, and virtual machines.....	15
Virtual machine management and server migration .....	15
HP Server Migration Pack - P2ProLiant edition .....	16
Power management.....	16
Intelligent, network-infrastructure-aware software.....	16
HP Insight Control Linux Edition .....	17
iLO 2 – remote server management and control .....	18
iLO 2 Standard Blade Edition .....	18
iLO Select Pack.....	18
Appendix: Acronyms in text .....	20
For more information.....	22
Call to action .....	22

## Abstract

As demands for IT efficiency and responsiveness increase, simplifying system management becomes increasingly critical. The complexity, high costs and inflexibility of a conventional IT infrastructure are the direct result of the static and hardwired way it is built, the silos it creates and the increasingly sluggish management processes behind it. Increasing complexity and manual coordination between the server, LAN and SAN can turn what should be a simple, 30-minute process—such as deploying a new server—into a week-long ordeal. HP continuously and aggressively develops powerful new management technologies to give system administrators access and control of ProLiant servers and ProLiant server clusters located anywhere. This paper describes key HP management technologies and how they work within the HP BladeSystem c-Class to deliver an adaptive infrastructure for next-generation datacenters.

The HP BladeSystem c-Class consolidates power, cooling, connectivity, redundancy, and security into a modular, self-tuning system with intelligence built in. At the heart of the HP BladeSystem is the management which is comprised of both the embedded management capabilities built into the platform as well as the management software. The embedded management delivers simple, built-in control interfaces while the management software monitors the infrastructure to streamline operations and increase administrator productivity. The complete solution manages all components of the infrastructure as one system. The embedded capabilities and software provide active monitoring, simplify operations, and save time and ensure high service quality levels. Once in place, the HP BladeSystem c-Class becomes a foundation for simplified and efficient planning, growth and administration. The HP components discussed herein are the Onboard Administrator, HP Insight Control Management and the HP Integrated Lights Out (iLO) 2.

The HP Onboard Administrator for BladeSystem c-Class simplifies enclosure setup and provides integrated enclosure management, including power and cooling management. HP Insight Control Management Data Center Edition leverages the same familiar management tools that customers have used to manage existing HP ProLiant server and HP BladeSystem p-Class infrastructures, which include HP Systems Insight Manager (HP SIM) and ProLiant Essentials. The more recent HP Insight Control Linux Edition (formerly Control Tower) provides Linux-optimized management and deployment capabilities for HP BladeSystem c-Class. HP Integrated Lights Out (iLO) 2 provides remote administration and virtual KVM access.

## HP Onboard Administrator for BladeSystem c-Class

One of the HP BladeSystem c-Class architecture design goals is to dramatically reduce the amount of time that IT personnel must spend to deploy new systems. To achieve this design goal, HP provided an intelligent infrastructure that will make available essential power and cooling information to administrators and help automate the management of the infrastructure. The implementation of the Onboard Administrator is the result of these goals.

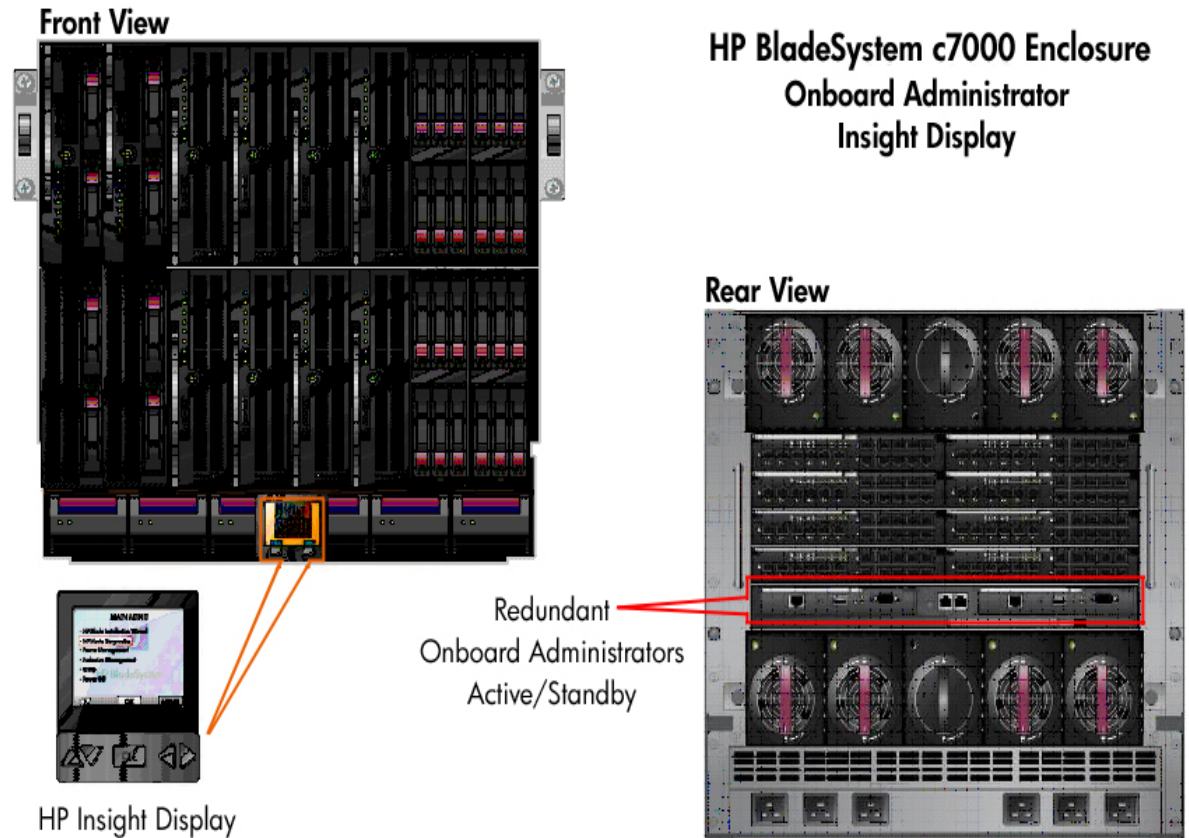
The Onboard Administrator (OA) (Figure 1) includes a simple LCD screen on the front of each HP BladeSystem c7000 enclosure for quick setup and daily maintenance, plus redundant management controller modules that reside in the rear of the enclosure. The OA modules communicate with the iLO 2 management processors on each server blade to form the core of the management architecture for HP BladeSystem c-Class. HP BladeSystem c7000 enclosure customers have the option of installing a second OA board to act as a completely redundant controller in an active-standby mode. There are three ways for IT technicians and administrators to access the OA:

1. The OA's Insight Display is a rack mounted interactive display device; the Insight Display is covered in more detail later in this paper.
2. The web graphical user interface (GUI) uses event-driven, push technology. No screen refresh is necessary in order to view failures and/or events. If an event occurs, its status is pushed to the

web GUI immediately. The web GUI provides seamless integration with OpenView, Insight Control Data Center Edition and Insight Control Linux Edition.

3. The Command Line Interface (CLI) provides command line and scripting interfaces.

**Figure 1.** Front and rear view of the HP BladeSystem c7000 enclosure depicting the location of the Onboard Administrator modules and the Insight Display.



## Configuration logic

One of the major advantages of the HP BladeSystem c-Class is its flexibility in allowing customers to configure the system in virtually any way they desire. The configuration logic powers up the interconnect modules first. The server blade is not powered up until the Onboard Administrator has verified that the configuration is correct. If there is a configuration issue, the Insight Display indicates what the issue is and possible remedies. To assist in the configuration and setup process for the IT administrator, the Onboard Administrator verifies four attributes for each blade and interconnect module as they are added to the enclosure:

- Electronic keying—The OA automatically queries all Type I/II mezzanine cards and interconnect modules as they are deployed to check that the I/O fabric types match. If they do not, the OA issues a warning with suggested corrective action.
- Power—The OA ensures that there is sufficient power available to power up a server blade or interconnect module
- Cooling—The OA makes sure there is sufficient cooling capacity for the server blade or interconnect module.
- Location—If the enclosure is not fully populated, the OA makes sure that server blades, storage blades, Active Cool fans and power supplies are in the correct locations to receive the proper

cooling and to support the chosen power configuration. For example, if the administrator is installing only two server blades, they must be in bays 1, 2, 9, or 10. Similarly, fans must go into bays 4, 5, 9, and 10.

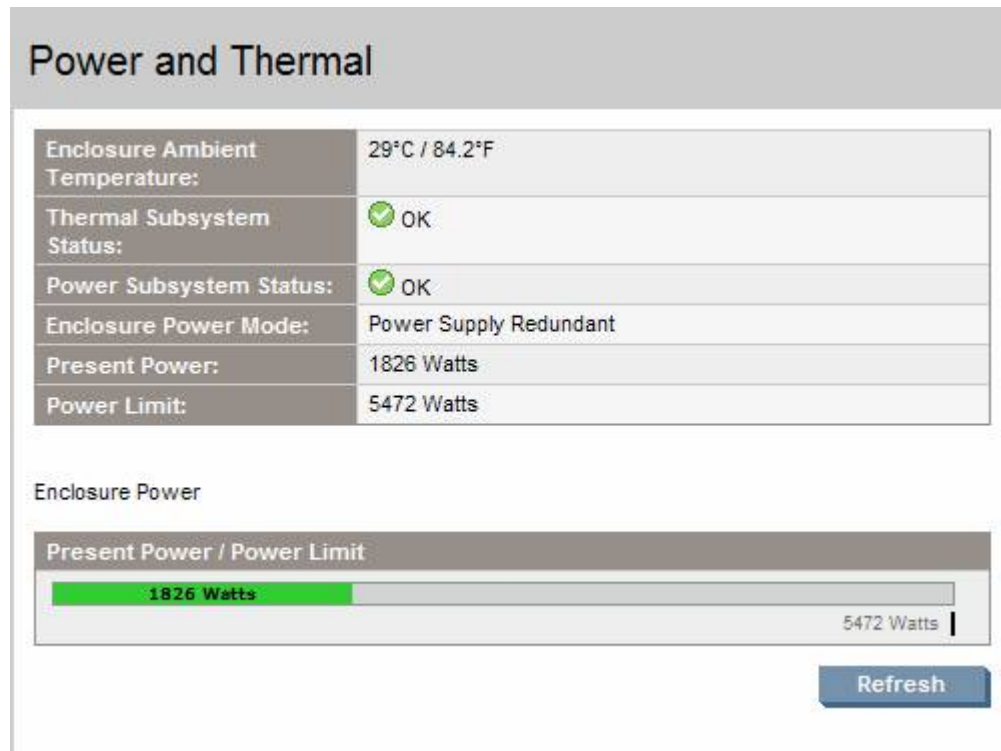
Rather than requiring separate log ins to multiple resources (once to each enclosure and/or once to every server management processor), the Onboard Administrator allows single point access. Thus, the administrator can use a single sign-on to log in to a single Onboard Administrator and use the web GUI to graphically view and manage the HP BladeSystem c-Class components within up to four linked enclosures. For example, an IT administrator could automatically propagate management commands—such as changing the enclosure power mode—throughout the linked enclosures.

## Thermal Logic management

The Onboard Administrator retrieves thermal information from all of the server blades, power supplies, Active Cool fans and interconnect modules in the enclosure. For a c7000 Enclosure filled with half-height blades, over 150 temperature sensors ensure an optimal balance between cooling, acoustic levels, and power consumption. If the enclosure's thermal load increases, the Onboard Administrator's Thermal Logic features instruct the Active Cool fan controllers to increase fan speeds to accommodate the additional demand.

The speed of the fans can be adjusted to reduce noise and power consumption and to compensate for airflow differences within the enclosure. The performance of each subsystem is monitored, and any failures or warnings are reported to the system log and Insight Control (when SNMP is enabled). The Onboard Administrator manages subsystem failure by taking appropriate action to maintain the enclosure's ability to operate, including adjusting fan speed, reducing power consumption, or performing shutdowns on some or all subsystems. The Thermal Logic power and cooling screen, Figure 2, delivers an overview of the power and thermal subsystems on a single screen.

**Figure 2.** Onboard Administrator screen depicting an overview of the BladeSystem c-Class power and thermal subsystems



## Power Logic management

The Onboard Administrator manages component power allocation and can limit overall enclosure power consumption. This feature is often referred to as *power capping*. It uses power measurement sensors to accurately monitor how much power is being consumed and how much power is available. Because Onboard Administrator uses real-time measured power data instead of maximum power envelopes, customers can deploy as many servers and interconnect modules as possible for the available power.

The c7000 Enclosure power management system allows for a variety of configurations. The Onboard Administrator Power Logic management facilitates mode selection. Table 1 discusses Onboard Administrator managed power modes.

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### NOTE:

If redundancy mode is either AC Redundant or Power Supply Redundant and power redundancy is lost, any additional power requests from the Onboard Administrator will not be accepted even if there is enough non-redundant power available. For example, newly inserted server blades will not be allowed to power on. Either the failure must be corrected or the redundancy mode be changed.

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**Table 1.** Onboard Administrator managed power modes

Mode	Insight Display name	Description
AC Redundant Power Mode	AC Redundant	In this configuration, N power supplies are used to provide power and N are used to provide redundancy (where N can equal 1, 2, or 3). Up to three power supplies can fail without causing the enclosure to fail. When correctly wired with redundant AC line feeds, this configuration also ensures that an AC line feed failure will not cause the enclosure to power off.
Power Supply Redundant Power Mode	Power Supply Redundant	Up to six power supplies can be installed. One power supply is always reserved to provide redundancy. In the event of a single power supply failure, the redundant power supply takes over the load of the failed power supply. An AC line feed failure of more than one power supply causes the system to power off.
Non-Redundant Power	None	There is no power redundancy. Any power supply or AC line failure will cause the system to power off.
Dynamic Power Savings Mode	Power Saving Mode	If enabled, Dynamic Power Savings Mode automatically places unused power supplies in standby mode to increase enclosure power supply efficiency, thereby minimizing enclosure power consumption during decreased power demand. Increased power demands automatically return standby power supplies to full performance.
Enclosure Input Watts Limit	Watts Limit	An optional setting intended for two situations: <ul style="list-style-type: none"> <li>• In the case where facility power is limited, OA allows setting a fixed limit for each enclosure so that the total power consumption will not exceed the facility power limit. Example: Hosted location limits power to 5,000 W. Enter 5000 into the Limit Enclosure AC Input Watts field. The OA will limit total power allocation to 5,000 W; however, this may result in denying power to some of the server blades.</li> <li>• In the case where the facility limits cooling capacity to the enclosure, the OA can be set to limit power based on a cooling-to-power conversion equation. The facility's limit of BTU/hr available to the enclosure divided by 3.41 yields the watts limit for that enclosure. Example: The facility limits the cooling capacity to 27,280 BTU/hr. Dividing 27,280 by 3.41 yields 8,000 W. Enter that watts limit to restrict that enclosure to 27,280 BTU/hr. This limit may result in denying power to some of the server blades.</li> </ul>

Dynamic Power Savings mode is the default setting. The Onboard Administrator manages this mode based on the principle that power supplies operate inefficiently when lightly loaded and more efficiently when heavily loaded. A typical power supply running at 20 percent load could have efficiency as low as 60 percent; but at 50 percent load it could be 90 percent efficient, thus providing significant savings in power consumption. Using real time tracking of the total enclosure power consumption, the Onboard Administrator will shut down or start up power supplies as required maintaining the number of power supplies/current load requirements ratio in the maximum efficiency range. The number of power supplies active at any given time is determined by calculating the number of power supplies necessary to maintain the power load requirements and to keep the active power supplies in the high efficiency range. When Dynamic Power Savings mode is enabled some of the power supplies can be automatically placed on standby to increase overall enclosure power subsystem efficiency. When Dynamic Power Savings mode is disabled, all power supplies share the load. The power subsystem efficiency varies based on load.

## Enclosure bay IP addressing

The Onboard Administrator significantly enhances the network infrastructure management by offering two methods to initially configure the IP addresses of the server blade iLO 2 ports and the interconnect module management ports via the management network: DHCP or Enclosure Bay Static IP Addressing. This configuration capability is managed through a single point, the Onboard Administrator, as opposed to managing each iLO or interconnect module individually.

The server blade iLO 2 defaults to DHCP addressing, obtained through the network connector of the active Onboard Administrator. Interconnect modules that have an internal management network connection to the Onboard Administrator may also default to DHCP address. The Onboard Administrator GUI lists the IP address for the server blade iLO 2 port and interconnect module management port.

Enclosure Bay IP Addressing (EBIPA) is used to assign a range of static IP addresses to individual server blades and interconnect module bays. When a server blade or interconnect module is configured for DHCP and is inserted into a bay that has EBIPA enabled, that management port will get a specific static IP address from the Onboard Administrator. The system administrator sets an independent and unique IP address range for the server blade bays and the interconnect module bays using the Onboard Administrator EBIPA setup wizard. The first address in a range is assigned to the first bay and then consecutive bays through the range. For example, if the server bay EBIPA range is set from 16.100.226.21 to 16.100.226.36, then the iLO 2 in Server bay #1 will be assigned 16.100.226.21 and the iLO 2 in Server bay #12 is assigned 16.100.226.32. If the interconnect bay EBIPA range is set from 16.200.139.51 to 16.209.139.58, then the interconnect module management port in Interconnect bay #1 will be assigned 16.200.139.51 and the interconnect module management port in Interconnect bay #7 will be assigned 16.200.139.57.

The OA also supports manual static IP address assignment: The OA allows changing each of the server blade iLO 2 ports and interconnect module management ports to unique static addresses.

## HP Virtual Connect architecture

HP BladeSystem c-Class is designed from the ground up integrating the Virtual Connect architecture. The benefits of this technology are derived from key capabilities built into the communication and control infrastructure. Without the support from these built-in capabilities there is simply no other way to achieve the level of functionality provided by the HP BladeSystem c-Class; that is, intuitive ease of use, smooth integration and scalable implementation. This level of functionality must be built in; it cannot be bolted on.

Virtual Connect implements server-edge virtualization: It puts an abstraction layer between the servers and the external networks so that the LAN and SAN see a pool of servers rather than individual servers. Once the LAN and SAN connections are made to the pool of servers, the server administrator uses a Virtual Connect Manager User Interface to create a server identity. The Virtual Connect Manager (VC Manager) creates a server-specific I/O profile, consisting of unique media access control (MAC) addresses for all network interface cards (NIC) and World Wide Names (WWN) for all host bus adapters (HBAs). VC Manager replaces each server's default MAC addresses for NICs and WWNs for HBAs with its server-specific I/O profile. These profiles are managed locally.

Network and storage administrators can establish all LAN and SAN connections once during deployment and need not make connection changes later if servers are changed. As servers are added or changed, Virtual Connect keeps the I/O profile for that LAN and SAN connection constant.

Virtual Connect technology is provided by specific interconnect modules. The Virtual Connect modules plug directly into the interconnect bays of the HP BladeSystem c-Class enclosure. The modules can be placed side by side for redundancy (see Figure 3). The HP Virtual Connect Manager (VC Manager)

runs embedded on a Virtual Connect Ethernet module contained in the enclosure and it is accessible via the Onboard Administrator's management Ethernet interface.

VC Manager manages enclosure connectivity and is seamlessly integrated into both the HP Insight Control Data Center Edition and the HP Control Tower. VC Manager defines available LANs and SANs, sets up enclosure connections to the LAN or SAN, and defines and manages server I/O profiles. The VC Manager contains utilities to develop server profiles, replicate profiles for multiple deployments, and move profiles during failover. The server I/O profiles include the physical NIC MAC addresses, FC HBA WWNs, and the SAN boot configurations. Once this information is identified and stored by the VC Manager, it can be applied to any server installed in any device bay within the VC domain.

VC Manager facilitates the upgrade and/or replacement of a server by reassigning the I/O profile to a new server. Additionally, VC Manager can automatically move or failover a Virtual Connect profile from a failed server to a pre-determined spare server. All of this functionality is embedded in the Virtual Connect Module.

**Figure 3.** Illustration depicting the Virtual Connect modules in the HP BladeSystem c7000 enclosure

### Virtual Connect Ethernet module



- 8 – 1 GbE Cu RJ45 uplinks
- 2 – 10 GbE CX4 ports for uplink or stacking
- 16 – 1 GbE downlinks to servers
- 1 – 10 GbE internal cross-connect for module failover

### Virtual Connect Fibre Channel module



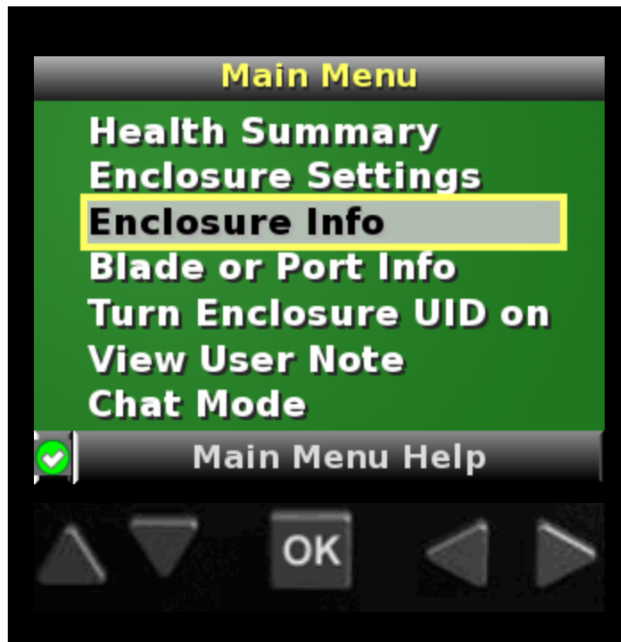
- 4 – 1/2/4 Gb auto-sensing uplinks
- 16 – 4 Gb downlinks to servers



## HP BladeSystem c-Class Insight Display

The Insight Display, Figure 4, is an ever-ready, rack-mounted information exchange device with access to all of the Onboard Administrator's setup, management, and trouble shooting features. It provides a quick and easy-to-use facility that enables the rack technician to initially configure the enclosure. It also provides information about the health and operation of the enclosure.

**Figure 4.** Main menu of Insight Display



When the enclosure is powered up for the first time, the Insight Display launches an installation wizard to guide the user through the configuration process. After configuring the enclosure, the Insight Display verifies that there are no installation or configuration errors.

The color of the Insight Display varies with the condition of the enclosure's health:

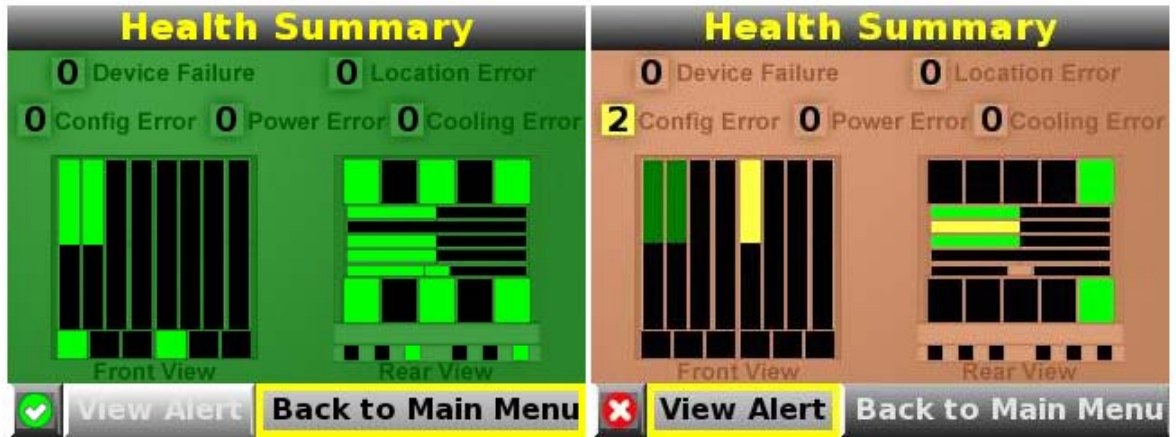
- **Blue**— The Insight Display illuminates blue to indicate that it is in configuration mode and is addressing a specific enclosure. The enclosure unit identification (UID) light is automatically turned on when the enclosure is powered up for the first time, and can be turned Off/On by selecting Turn Enclosure UID Off/On from the Main Menu or by pressing the enclosure Onboard Administrator UID button.
- **Green**—The Insight Display illuminates green when no error or alert conditions exist and the enclosure is operating normally.
- **Amber**—The Insight Display illuminates amber when the Onboard Administrator detects an error or alert condition. The details of the condition display on the screen. If the enclosure UID is on and an error or alert condition exists, the Insight Display illuminates blue as the enclosure UID takes priority over the alert.
- **Dark (no power)**—The Insight Display has a two-minute inactivity screen saver. If no action is taken and no alert condition exists, the screen light turns off after two minutes. Hitting any button on the Insight Display will reactivate the screen.

The Main Menu screen, depicted in Figure 4, is a navigation guide for function access. Using this menu the operator has access to the Initial setup installation wizard, Enclosure Management, Power management, and HP BladeSystem Diagnostics. The Insight Display simplifies initial setup for local rack personnel, facilitates local administration and provides PIN-based security. The Enclosure Health icon is located on the bottom left corner of every screen, indicating the condition of the enclosure's health. Navigation to the Health Summary screen can occur from any Insight Display screen.

Insight Display's Health Summary page, Figure 5, provides a quick view of overall enclosure and blade health as it displays all devices in a single view. This page displays error summary counters

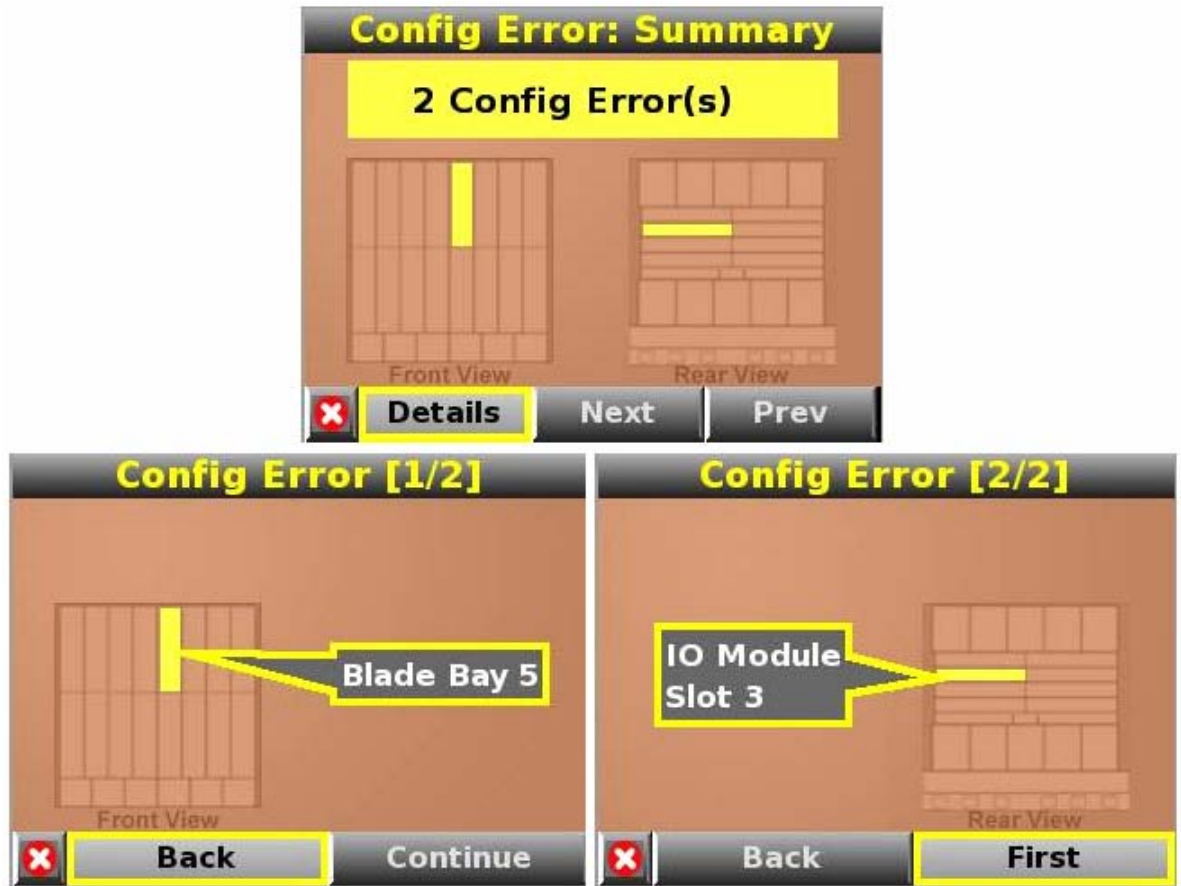
and has a View Alert capability available when errors are detected by the Onboard Administrator. When the enclosure is operating normally, the Health Summary screen displays green and when errors are present this screen displays amber.

**Figure 5.** Illustration of the Health Summary screens: The green background (left) indicates no errors; the amber background (right) indicates errors.



When an error or alert condition is detected, the Health Summary screen displays the total number of error conditions and the error locations. The Insight Display displays each error condition in the order of severity, see Figure 6. Critical alerts display first (if one exists), followed by caution alerts. Figure 6 depicts a configuration error between the server blade in bay 5 and the interconnect module in slot 3.

**Figure 6.** Illustration of the configuration error screens; Config Error: Summary screen (top); Detailed Config Error screens (bottom)



The Enclosure Settings and the Enclosure Info screens provide access to management and configuration capability and concise views of status information, respectively; see Figure 7.

**Figure 7.** Illustration of the Enclosure Settings and Enclosure Info screens



The Blade and Port Info screens present information about a specific server blade; see Figure 8.

**Figure 8.** Illustration depicting the Blade and Port information screens; Blade and Port selector screen (top left), Blade Info screen (top right), Rear Port summary screen indicating no errors (bottom left), Rear Port summary screen indicating errors (bottom right).

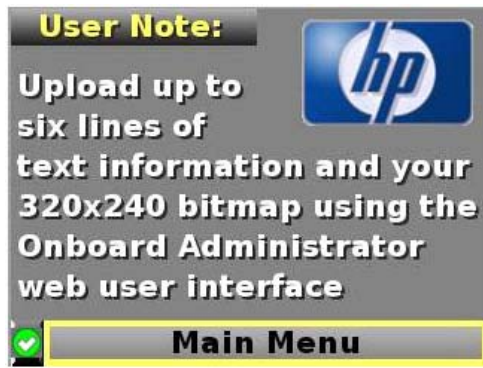


Figure 8, bottom left, illustrates a full-height server blade, with four embedded NICs. There are two interconnect modules located in interconnect bays 1 and 5, shown with bright green highlights. The other interconnect bays are empty. The four embedded NICs are connected to particular port numbers on the interconnect modules.

Figure 8, bottom right, depicts the Port Info screen with a configuration error. There is a mismatch between the Type I/II mezzanine card and interconnect module. Interconnect bay 3 contains a Fibre Channel interconnect module. Mezzanine 1 on the server blade is a gigabit Ethernet which does not match the technology of the interconnect module. Therefore an error displays.

The Insight Display provides a View User Note menu item, see Figure 9. This feature is the electronic equivalent of a *sticky note*. From time to time administrators may stick a note on a system or rack in order to communicate specific information to other personnel. However, the HP BladeSystem c-Class enclosure is completely optimized and virtually every square inch of it is used for a component or for airflow. Therefore, administrators can use this feature to alert personnel about a specific situation. For example, administrators can use this screen to display helpful information such as contact phone numbers or other important information.

**Figure 9.** View user note feature; the electronic equivalent of a *sticky note*



Additionally, the Insight Display provides a chat mode. It is a bidirectional communication mechanism between the Insight Display and the web GUI, see Figure 10. For instance, between an installer in the datacenter and the administrator back in their office. The installer can use the chat mode (similar to instant messaging) to communicate with the administrator about what needs to be done.

**Figure 10.** Chat mode screen



The Chat Mode screen, Figure 10, is used by the remote administrator who uses the web interface to send a message to an enclosure's Insight Display. The technician uses the Insight Display's buttons to select from a set of prepared responses, or dials in a custom response message on the ? line.

The Chat Mode screen has top priority in the Insight Display and will remain on the screen until **Send** is selected. The technician can leave this chat screen temporarily and use the other Insight Display screens, then return to the Chat Mode screen from the Main Menu to send a response. After the response, the Chat Mode screen is cleared. Both the **A** and **?** responses are then displayed to the remote Administrator on the web interface for LCD Chat.

## HP Insight Control Management Data Center Edition

Insight Control Data Center Edition is an integrated software suite that simplifies the provisioning and management of HP BladeSystem c-Class. Delivered on DVD media, Insight Control Data Center Edition uses a single integrated installer to deploy, configure, and license HP Systems Insight Manager (HP SIM) and HP ProLiant Essentials management software rapidly and consistently, reducing manual procedures and time to production. Insight Control Data Center Edition delivers core management functionality for HP BladeSystem c-Class lifecycles, including hardware resource

deployment, health monitoring, performance monitoring, vulnerability scanning, and patch management.

Insight Control Data Center Edition is delivered with HP BladeSystem c-Class enclosures. Table 2 lists the components delivered with the Insight Control Data Center Edition.

**Table 2.** Components of Insight Control Data Center Edition

Component	Description
HP Systems Insight Manager and its built-in blade management and control interface	HP SIM (Windows version) is installed as part of Insight Control Data Center Edition. SIM delivers unified infrastructure management and control for HP and non-HP server and storage resources. SIM's integrated blade management interface delivers enhanced functionality and control for HP BladeSystem c-Class (and p-Class) including automatically generated rack and enclosure visualization of blade resources, and access to Onboard Administrator and iLO 2 consoles.
HP ProLiant Essentials Rapid Deployment Pack	Configures and deploys multiple servers in an unattended fashion using scripts and system images. Includes predefined scripts to configure HP server hardware and deploy operating systems for Windows and Linux platforms. Provides blade-specific features such as rip-and-replace oriented server recovery, pre-provisioning of blade bays, and more.
HP ProLiant Essentials Performance Management Pack	Monitors system performance thresholds, and detects and analyzes hardware bottlenecks on HP ProLiant servers, HP Integrity servers, and HP Modular Smart Array (MSA) shared storage systems.
HP ProLiant Essentials Vulnerability and Patch Management Pack	Delivers comprehensive vulnerability assessment and advanced patch management to accelerate the remediation of vulnerabilities and reduce the risk of exploits.

## Graphical BladeSystem c-Class Discovery, Monitoring and Administration

HP System Insight Manager's blade systems management capabilities include automatically drawn blade rack topology views. The blade interface in HP SIM installs with any Systems Insight Manager installation. For more detailed information visit the HP web site at <http://h18004.www1.hp.com/products/servers/management/bsic/index.html>.

The blade interface in HP SIM also enables users to quickly navigate their entire blade environment via tree views and the blade rack and enclosure views. Users are able to perform management tasks to individual or groups of blade servers/desktops/workstations, switches, etc. Additionally, the user can easily set up logical groups of BladeSystems for convenient management and control.

## Performance Management and Bottleneck Analysis

ProLiant Essentials Performance Management Pack (PMP) provides the tools needed to receive proactive notification of building bottleneck conditions and to debug existing performance issues. PMP is automatically installed and shares operational integration with HP SIM. PMP analyzes performance information to determine if there is a building or existing performance bottleneck issue. PMP can interactively display this information, log the information to a database for later analysis or reporting, and set up proactive notification using the HP SIM notification mechanism. For more detailed information, visit the HP web site at <http://h18004.www1.hp.com/products/servers/proliantessentials/valuepack/PMP/index.html>.

PMP provides a concise overview of configuration anomalies that could impact performance, like faster drives on slower controllers, NICs set to half-duplex, PCI cards concentrated on a single PCI bus, etc. PMP provides detailed information on the subsystem that causes performance constraints, enabling pinpointed configuration changes or upgrades to economically extend the useful life of server. PMP provides a summary report containing both a performance profile (showing for each of

the subsystems the percentage of time that performance is out of spec) and a detailed server inventory for each subsystem.

The logged data replay tool in PMP allows replaying previously collected data as if it were just happening or with compressed time frames. PMP allows the user to extract performance data for one or several servers into an external comma separated value (CSV) file that can be read by many desktop reporting packages. PMP will also generate summary reports on how often servers experience performance issues and what the overall system utilization was.

## Consolidated Vulnerability and Patch Management

The HP ProLiant Essentials Vulnerability and Patch Management Pack delivers automated acquisition, optimized deployment and continuous enforcement of software patches. It automatically collects new vulnerability updates and patches directly from vendor sources, such as a vendor's web-based patch depository. Updates can be acquired outside the firewall and imported into the patch repository in infrastructures where firewall policies prevent http and ftp downloads. Users can schedule the download of vulnerability and patch updates at a frequency of their choosing. For more detailed information visit the HP web site at

<http://h18004.www1.hp.com/products/servers/proliantessentials/valuepack/vpmp/index.html>.

Schedulable deployment, schedulable reboots after deployment, and checkpoint-restarts ensure that patches are deployed with minimal impact on network resources, and allow patches to be managed from a central point. Unique desired-state management automatically and continuously ensures that patches remain applied in their proper state. If patches are corrupted in any way, they are automatically reinstalled to bring the system back to the appropriate patch level.

The VPM enables systems administrators to quickly identify and patch security vulnerabilities on ProLiant and non-HP systems. The fact that patching operations can be based on the results of security scans means that only the correct patches are applied. In addition Version Control allows systems administrators to compare system software on ProLiant servers to customer-established baselines and centrally update out-of-date components. Systems with consistent system software baselines tend to be more stable and easier to troubleshoot.

## Deploy OS, virtualization layer, and virtual machines

Rapid Deployment Pack provides an easy-to-use deployment tool that can be linked with HP SIM. The ProLiant Essentials Rapid Deployment Pack (RDP) gives administrators the ability to easily deploy one or many servers in an unattended, automated fashion. RDP provides a fast, easy-to-use, drag-and-drop solution for deploying standard server configurations and software builds from a remote console. The Deployment Server function within RDP provides capabilities that incorporate the iLO management features of powering on, powering off, or cycling power on a target server. RDP facilitates high-volume installation, configuration, and deployment of servers through either a GUI-based or a web-based console, using either scripting or imaging technology. RDP can deploy physical systems as well as virtualization hosts and guests.

For more detailed information about RDP, visit the HP web site at

<http://h18004.www1.hp.com/products/servers/management/rdp.html>.

## Virtual machine management and server migration

ProLiant Essentials Virtual Machine Management Pack (VMMP) provides integrated management and control of physical and virtual infrastructure. For more detailed information visit the HP web site:

<http://h18004.www1.hp.com/products/servers/proliantessentials/valuepack/vms/index.html>.

The Server Migration Pack facilitates migration of physical resources to virtual resources, virtual resources to physical, and moves of virtual machines between different virtualization layers (for example, VMware GSX to ESX). VMMP supports flexible VM move options including:

- Initiating VMware VMotion for live VM moves (requires VMware VirtualCenter)
- SAN-based fast moves for VM moves between dissimilar hardware (Intel to AMD, G2 to G3)
- File-copy move for VM moves to hosts not connected to a SAN
- Alternate host recovery, that is, setting an alternate host for a VM and if it fails, starting up the VM on new host

## HP Server Migration Pack - P2ProLiant edition

To migrate older servers to the new ProLiant servers, HP offers the HP Server Migration Pack - P2ProLiant edition for a point-click-and-migrate environment that automates the process of migrating to a new server. It essentially lands all the drivers that the administrator would normally move manually, and then pulls all the existing data, applications, and operating system on top. This will save HP customers a significant amount of time when deploying new servers. HP P2ProLiant transfers an entire server (OS, application, and data) without any errors, by performing a sector by sector copy to ensure that the destination server is an exact replica of the source server, and ensures that the correct device drivers are used on the destination server

Additional information on the HP Server Migration Pack - P2ProLiant edition is provided at the HP web site:

<http://h18000.www1.hp.com/products/servers/proliantessentials/valuepack/migrate/benefits.html>.

## Power management

HP's ProLiant Power Regulator provides Integrated Lights-Out (iLO)-controlled speed stepping for Intel x86 processors. The Power Regulator feature improves server energy efficiency by giving CPUs full power for applications when they need it and power savings when they do not. This power management feature enables ProLiant servers with policy-based power management to control CPU power state. Power Regulator can be configured for continuous, static low power mode or for dynamic power savings mode in which power is automatically adjusted to match application CPU utilization demand.

Power workload balancing will provide the ability to maximize performance per watt. Power workload balancing uses the HP Power Regulator technology to manage power at an enclosure level to ensure that power usage stays within defined power caps. Busy servers receive maximum power for high performance while power consumption is reduced on idle or less busy devices to ensure that they stay within defined power caps. Power workload balancing will be implemented in a future revision of the OA firmware but is not available at the date of this publication.

Additional information on the HP Power Regulator is provided in the paper titled "Power Regulator for ProLiant," available at [www.hp.com/servers/power-regulator](http://www.hp.com/servers/power-regulator).

## Intelligent, network-infrastructure-aware software

ProLiant Essentials Intelligent Networking Pack (INP) is a networking product designed by HP that is aware of the network infrastructure beyond the first tier of switches. Most standard industry software only detects server downtime and network bottlenecks on the first tier of the switch. For more detailed information about INP, visit the HP web site at

<http://h18004.www1.hp.com/products/servers/proliantessentials/inp.html>.

An advanced teaming capability allows the ProLiant servers to adapt to and change the network path to achieve maximum availability and performance. Active path failover allows the ProLiant server to

predict and bypass blocked or failed network paths. This failover option utilizes the core network system or the Echo Node to confirm connectivity. The NICs in the team constantly check for path availability, and the primary NIC fails over as soon as its path becomes unavailable. Fast path failover allows the ProLiant server to use the fastest path to the network destination for all network transactions. The primary NIC will failover to the secondary or backup NIC after it determines that there is a faster and more efficient route to the network core switch. Dual channel teaming allows the ProLiant server to configure a team of teams that spans across two switches and supports both receive and transmit load balancing.

INP leverages key characteristics of viruses to slow their spread across servers. ProLiant customers can use INP to monitor network traffic for virus-like activity, to slow and limit the rate of connections to "new" machines, and to slow down the spread of viruses while not affecting normal server usage. The Virus Throttle feature, developed by HP Labs, constantly monitors network traffic for virus-like activity. If virus-like activity is discovered INP slows and limits the rate of connection to "new" machines, thus slowing down the spread of viruses while not affecting normal server usage.

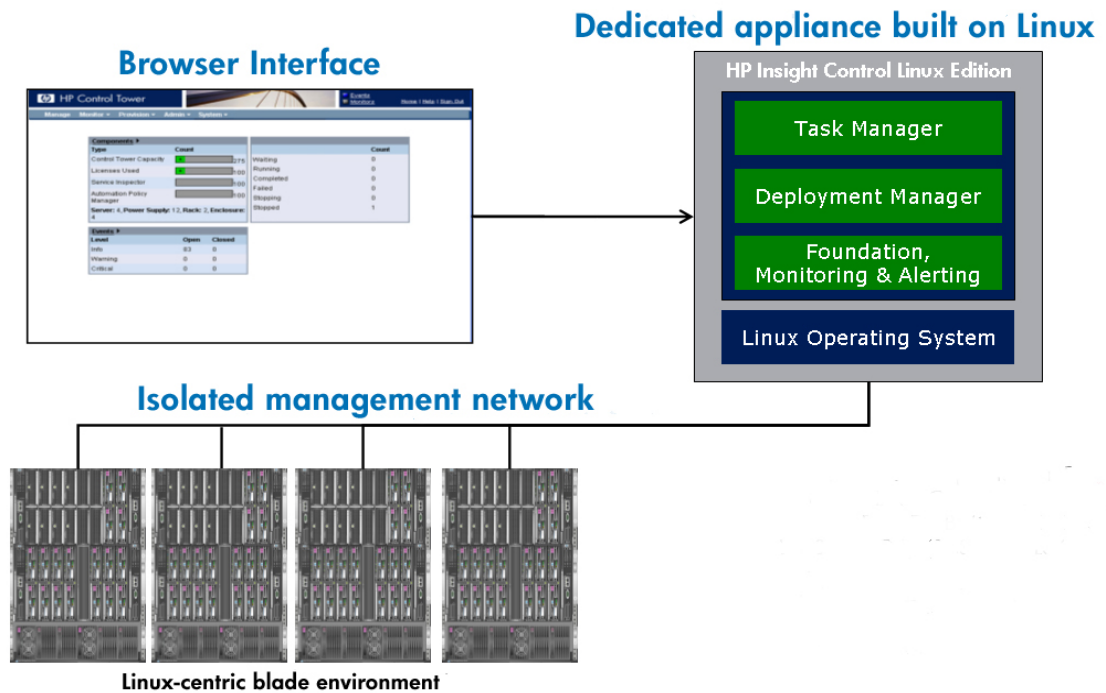
## HP Insight Control Linux Edition

HP Insight Control Linux Edition is an all-in-one Linux-hosted blade management and deployment software package. Built on the Control Tower software, this package delivers deployment and in-depth management designed for HP BladeSystem c-Class. The product is oriented around ease of setup and usage, and being suited for the Linux-centric customer. Insight Control Linux Edition uses a secure and isolated management network for discovery, monitoring and remote management. Additionally, all deployment tasks are served over this management network.

Insight Control Linux Edition is a strategic component of HP's software portfolio. While HP SIM and RDP are ideal at addressing mixed platform and operating system environments, Insight Control Linux Edition is focused on delivering an HP BladeSystem-specific and Linux-optimized management and deployment solution (supports Linux and Windows targets). Figure 11 shows how HP Insight Control Linux Edition operates.

For more detailed information about Insight Control Linux Edition, visit the HP web site at <http://www.hp.com/go/insightcontrollinuxedition>

Figure 11. HP Insight Control Linux Edition operational diagram



## iLO 2 – remote server management and control

### iLO 2 Standard Blade Edition

HP Integrated Lights-Out 2 Standard Blade Edition enables essential remote management capabilities as standard features on ProLiant BL c-Class blade servers. iLO 2 Standard Blade Edition provides the headless infrastructure needed to perform a wide variety of system administration tasks remotely. iLO 2 Standard Blade Edition provides all of the remote control capabilities typically offered as standard features on ProLiant servers plus:

- High-performance, Virtual KVM remote console and browser-based virtual media, essential to administering HP BladeSystem c-Class servers.
- Anytime access to system management information such as hardware health, event logs and configuration is available to troubleshoot and maintain blades.
- Integrated remote console provides a single, Java-free screen from which to control virtual power and the system remote console in pre-OS mode.
- Embedded system health provides access to basic hardware status independent of the operating system.
- iLO 2 shared network port supports VLAN tagging to improve network security and logical isolation from production data.

### iLO Select Pack

For more advanced Lights-out management capabilities, the iLO 2 Standard Blade Edition can be upgraded with the optional licensed product, ProLiant Essentials iLO Select Pack. iLO 2 Select enables more advanced security, virtual media and power management capabilities:

- Full virtual media support for installation of firmware and software on a remote server from a client PC or network web server using a browser, command line or script
- Continuous Power Regulator reporting of system power and heat characteristics
- Directory services integration consistent with iLO and RILOE II that enables efficient and effective management of user access via Microsoft Active Directory or Novell eDirectory
- Simplified single sign-on access to any iLO 2 management processor from Onboard Administrator using directory services authentication
- Two-factor authentication for strong Smart Card based controlled access to iLO 2 capabilities

## Appendix: Acronyms in text

The following acronyms are used in the text of this document.

**Table A.-1.** Acronyms

<b>Acronym</b>	<b>Acronym expansion</b>
CLI	Command line interface
CPU	Central processing unit
CSV	Comma separated value
EBIPA	Enclosure Bay IP Addressing
FC	Fibre channel
GUI	Graphical User Interface
HBA	Host bus adapter
HP SIM	HP Systems Insight Manager
iLO	Integrated Lights Out
INP	ProLiant Essentials Intelligent Networking Pack
ISEE	HP Instant Support Enterprise Edition
LAN	Local area network
LUN	Logical unit number
MAC	Media access control
MSA	HP Modular Smart Array
NIC	Network interface card
OA	Onboard Administrator
OSEM	HP Open Service Event Manager
P2V	Physical-to-virtual
PCI	Peripheral component interconnect
PMP	ProLiant Essentials Performance Management Pack
RDP	ProLiant Essentials Rapid Deployment Pack
SAN	Storage area network
SNMP	Simple network management protocol
SSH	Secure shell
SSL	Secure socket layer
UID	Unit identification
V2P	Virtual-to-physical
V2V	Virtual-to-virtual
VC Manager	Virtual Connect Manager

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VMMP	ProLiant Essentials Virtual Machine Management Pack
VPM	ProLiant Essentials Vulnerability and Patch Management Pack
WWN	World wide name

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## For more information

For additional information, refer to the resources listed below.

Topic	Resource Hyperlink
HP BladeSystem technology briefs: HP BladeSystem c-Class Virtual Connect HP BladeSystem c-Class Enclosure HP BladeSystem c-Class architecture	<a href="http://h18013.www1.hp.com/products/servers/technology/whitepapers/proliant-servers.html#bl">http://h18013.www1.hp.com/products/servers/technology/whitepapers/proliant-servers.html#bl</a>
HP Insight Control Data Center Edition	<a href="http://h18013.www1.hp.com/products/servers/management/bsic/index.html">http://h18013.www1.hp.com/products/servers/management/bsic/index.html</a>
HP Insight Control Linux Edition	<a href="http://www.hp.com/go/insightcontrollinuxedition">http://www.hp.com/go/insightcontrollinuxedition</a>
iLO 2	<a href="http://h18013.www1.hp.com/products/servers/management/ilo2-blades/index.html">http://h18013.www1.hp.com/products/servers/management/ilo2-blades/index.html</a>
Onboard Administrator	<a href="http://h18004.www1.hp.com/products/blades/components/onboard/index.html">http://h18004.www1.hp.com/products/blades/components/onboard/index.html</a>

## Call to action

Send comments about this paper to [TechCom@HP.com](mailto:TechCom@HP.com).

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