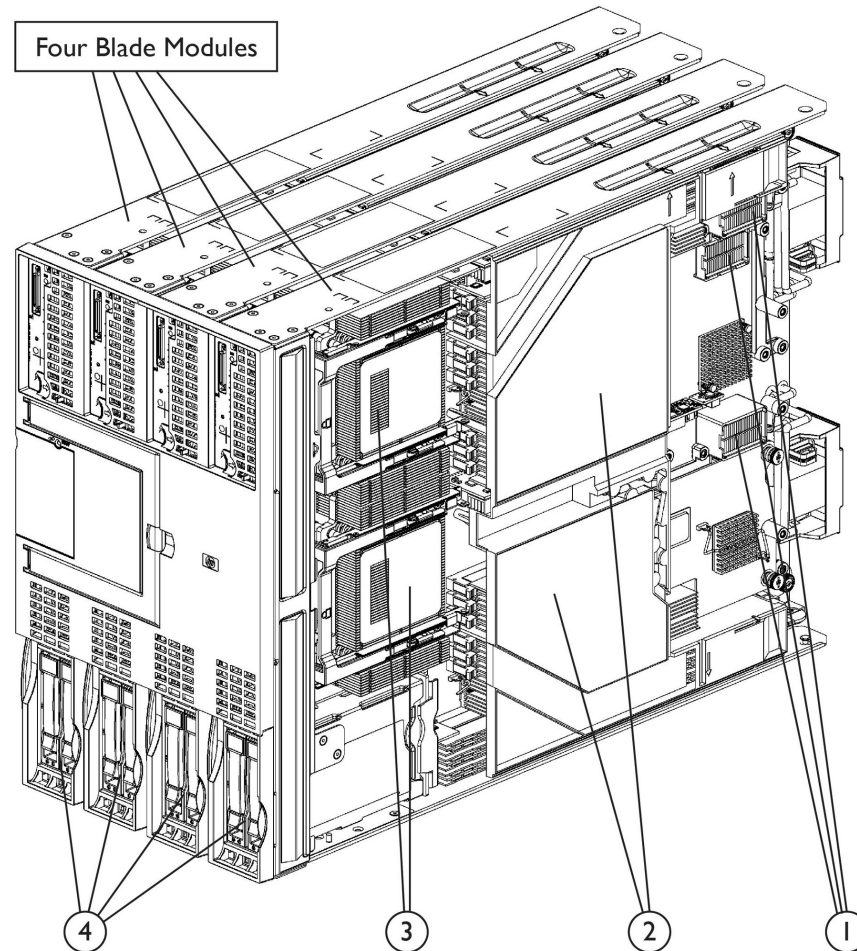


Overview



HP Integrity BL890c i4 Server Blade

- | | |
|--|--|
| 1. 12 x PCIe mezzanine slots (per BL890c i4) | 3. 8 x Intel® Itanium® processor 9500 series sockets (per BL890c i4) |
| 2. 96 x DDR3 DIMM slots (per BL890c i4) | 4. 8 x SFF SAS HDDs, hot-swap bays (per BL890c i4) |

Overview

What's New

- Intel® Itanium® processor 9500 series 8-core and 4-core processors
- 33% increase in memory bandwidth via 6.4GT/s Quick Path Interconnect (QPI) links
- Faster (1067 MT/s) and Low Voltage PC3L-10600 Registered CAS 9 Memory DIMMs
- Dynamic CKE, for economical use of power resources
- Eight integrated 10Gb Converged Network Controllers in an FCoE LAN on Motherboard (LOM) implementation
- Integrated SAS read only 512MB cache
- HP nPartitions (nPars) for BL8x0c i4 servers, for optimal allocation of resources to manage total cost of ownership and improved mission critical resiliency

At A Glance

This document covers the HP Integrity BL890c i4 server blade only. For more information on HP BladeSystem c-Class Enclosure and HP BladeSystem c-Class Interconnect and Mezzanine Components, please see the following QuickSpecs:

- HP BladeSystem c3000 Enclosure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html
- HP BladeSystem c7000 Enclosure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html
- HP BladeSystem c-Class Interconnect and Mezzanine Components:
<http://h18004.www1.hp.com/products/blades/components/c-class-interconnects.html>
<http://h18004.www1.hp.com/products/blades/components/c-class-adapters.html>

The HP Integrity BL890c i4 delivers the performance, reliability, and availability on HP's 64-bit operating system HP-UX 11i v3 for the ultimate in scalability and flexibility in deployment. To further enrich your cost-efficient, consolidated Integrity blade infrastructure, Virtual Server OE (VSE-OE) can help with solution components such as HP-UX Virtual Partitions (vPars) v6.1, HP Integrity Virtual Machines (Integrity VM), HP Capacity Advisor, HP Global Workload Manager, and automation through HP Infrastructure Orchestration. Additionally, High Availability OE (HA-OE) provides high availability via the HP Serviceguard clustering technology and Data Center OE (DC-OE) brings the best of the virtualization capabilities along with high availability together in one integrated OE.

HP Integrity BL890c i4 server blade includes:

- **Processor:**
 - Up to eight Intel® Itanium® 9500 Series processors
- **Memory:**
 - Up to 1.5 TB of memory. Supporting (96) DDR3 registered memory modules (R-DIMMs)
- **Storage Controller:**
 - Four (4) Embedded HP Smart Array p410i SAS Controllers
 - RAID 1 and RAID 0, and HBA mode configuration options
 - Four (4) Embedded SAS read only 512MB cache, one per embedded HP Smart Array p410i SAS controller
- **Internal Drive Support:**
 - Supports up to (8) eight small form factor (SFF) SAS hot plug hard drives
- **Network Controller:**
 - Sixteen (16) integrated HP NC553i 10Gb FlexFabric adapter ports supporting 10Gb/1Gb autosensing Ethernet, FCoE, Flex-10, and TCP/IP offload engine

NOTE: FlexFabric capability requires OS drivers and the use of an HP Virtual Connect FlexFabric module. Learn more at: www.hp.com/go/virtualconnect

NOTE: BL8x0c i4 server blades require Virtual Connect 3.70 or later when used in Virtual Connect configurations
- **Mezzanine Support:**
 - Twelve (12) additional I/O expansion slots via mezzanine cards.

Overview

- Supports up to (12) mezzanine cards
 - HP NC553m Dual Port 10Gb FlexFabric Adapter
 - NOTE: A maximum of 8 HP BLc NC553m Dual Port 10Gb Adapters are supported with BL890c i4
 - HP NC551m Dual Port 10Gb FlexFabric Adapter
 - NOTE: A maximum of 8 HP BLc NC553m Dual Port 10Gb Adapters are supported with BL890c i4
 - HP NC552m 10Gb 2-port Flex-10 Ethernet Adapter
 - HP NC532m Dual Port Flex-10 10GbE BL-c Adapter
 - NOTE: A maximum of 8 HP BLc NC532m Dual Port Flex-10 10Gb Adapters supported with BL890c i4.
 - HP Emulex LPe1205 8Gb FC BL-c HBA (2-port 8Gb Emulex FC HBA)
 - HP QMH 2562 8Gb FC BL-c HBA (2-port 8Gb QLogic FC HBA)
 - HP Smart Array P711m/1G FBWC 6G SAS Controller
 - HP Smart Array P700m/512 Controller
 - HP 4X QDR IB CX-2 Dual Port Mezz HCA for HP BladeSystem c-Class
 - HP NC364m 4-port 1GbE BL-c Adapter
 - HP NC360m 2-port 1GbE BL-c Adapter
- **USB Support:**
 - Four (4) Internal USB ports on the BL890c i4
 - Two (2) External USB ports on the BL890c i4 via SUV cable
- **Management:**
 - HP Integrity Server Blades Management Software
 - Integrity Integrated Lights-Out 3 (iLO 3) management processor
 - HP Insight Control
 - HP System Management Homepage
 - HP-UX 11i Management Software for Integrity Blades, www.hp.com/go/hpuxblades
 - HP Ignite-UX
 - HP-UX Software Assistant (SWA)
 - HP Dynamic Root Disk (DRD)
 - HP BladeSystem Infrastructure Management Software:
 - HP BladeSystem c-Class Onboard Administrator
 - HP BladeSystem c-Class Virtual Connect
 - Enterprise Management Software
 - Data Protector Software
 - GlancePlus Pak
 - Performance Manager and Agent
 - **HP nPartitions (nPars) for BL8x0c i4 servers:**
 - Provide improved scalability, availability, and fault isolation, and a rich set of virtualization options for the BL890c i4. nPartions are seamlessly integrated into the converged infrastructure environment, including Virtual Connect and HP Insight management tools, such as HP SIM. System administrators will find nPartitions configuration management quick and easy to use
 - Provide electrically isolated hard partitions at the hardware level
 - Support for up to four (4) nPartitions per BL890c i4
 - Reconfigure partitions simply and quickly via iLO GUI
 - Scale up to one (1) 8-socket nPartition or
 - Scale out to two (2) 4-socket nPartitions
 - Scale out to four (4) 2-socket nPartitions
 - Reboot required when re-configuring
 - Fault isolation cannot be serviced independently
 - Each nPartition is managed just like a similarly sized server
 - Two (2) socket nPartitions are managed like a BL860c i4
 - Four (4) socket nPartitions are managed like a BL870c i4
 - Eight (8) socket nPartitions are managed like a BL890c i4

Overview

- The Onboard Administrator provides access to each nPartition
- Other management tools, like HP SIM, Virtual Connect, and HP SUM display data for each nPartition as if it were an individual server
- Each nPartition in a BL890c i4 can be further partitioned through software virtualization tools:
 - HP-UX Virtual Partitions (vPars)
 - Integrity Virtual Machines (Integrity VM)
 - Up to 256 HP Virtual Machines per nPartition
 - HP-UX Containers
- **Virtualization with HP Matrix OE for HP Integrity servers,** www.hp.com/go/insightdynamics/integrity
 - Advanced Infrastructure Management
 - HP Capacity Advisor (which includes HP Virtualization Manager)
 - HP Virtualization Manager
 - HP Global Workload Manager and HP-UX Workload Manager
 - HP Matrix OE infrastructure orchestration
 - HP Systems Insight Manager
 - Virtualization Continuum
 - HP-UX Virtual Partitions (vPars) v6.1
 - HP Integrity Virtual Machines (with HP-UX Guest OS's)
 - HP Process Resource Manager/pSets
 - HP-UX Containers
 - Continuous availability
 - HP Serviceguard for HP-UX 11i
 - HP Serviceguard Extensions for SAP
 - HP Serviceguard Extensions for Oracle
 - HP Continentalclusters
- **Form Factor:**
 - HP Integrity BL890c i4 server blade is a full-height, quadruple wide (occupies 4 slots) BladeSystem c-Class form factor. The BL890c i4 server blade plugs into the BladeSystem enclosure. In the c7000 enclosure, 2 server blades are supported per 10U enclosure. 4 enclosures can be configured to a standard 42U rack; 8 BL890c i4 server blades can be configured in a fully populated rack. In the c3000 enclosure, 1 BL890c i4 server blade is supported per 6U enclosure.
- **Enclosures:**
 - HP offers two different c-Class server blade enclosures to meet your individual needs:
 - The HP BladeSystem c7000 rack enclosure is 10U high and holds up to 2 HP Integrity BL890c i4 servers plugged vertically. Four (4) enclosures can be configured to a standard 42U rack
 - The HP BladeSystem c3000 rack enclosure is 6U high and holds 1 HP Integrity BL890c i4 server plugged horizontally. Up to 7 enclosures can be configured to a standard 42U rack
 - The HP BladeSystem c3000 Enclosure targets three separate market segments:
 - Remote sites needing between 2 and 8 server blades
 - Mid-sized companies with between 3 and 100 servers in their company
 - Enterprise accounts with special datacenter requirement, such as DC power, or very limited rack power and cooling capacity.
 - Server blades, storage blades, and interconnect modules are all designed to fit into the c7000 and c3000 enclosures. For additional enclosure information, please see: <http://h18004.www1.hp.com/products/ blades/components/enclosures/c-class/index.html>.
- **Warranty:**
 - Protected by HP Services and a worldwide network of HP Authorized Channel Partners. Three-year parts, 3 Year Labor and 3 Year on-site limited global warranty. Certain restrictions and exclusions apply

Standard Features

Processor

One of the following
depending on Model

Octo-Core Processors

Intel® Itanium® 9560 2.53GHz/8-core/32MB/170W Processor

Intel® Itanium® 9540 2.13GHz/8-core/24MB/170W Processor

Quad-Core Processor

Intel® Itanium® 9550 2.4GHz/4-core/32MB/170W Processor

Intel® Itanium® 9520 1.73GHz/4-core/20MB/130W Processor

Upgradeability

Upgradeable to eight (8) processors

NOTE: The HP Integrity BL890c i4 supports 4, 5, 6, 7, or 8 processor configurations. Processors must be identical.

Cache Memory

One of the following
depending on Model

L2 cache per core; 512KB Instruction, 256KB Data

L3 cache; up to 24MB, see processor specifics

Cache Memory

One of the following
depending on Model

Level 1 (L1) on core 32KB cache; 16KB Instruction/16KB Data

Level 2 (L2) on core cache; 512KB Instruction/256KB Data

Up to 32MB shared Last Level Cache (LLC) per processor, see processor specifics above

Total 54MB on-die cache

All Processors support

Single bit cache error correction

50 bit physical addressing

64 bit virtual addressing

Integrated memory controllers and Scalable Memory Interconnect (SMI)

Intel Instruction Replay Technology

Enhanced instructions-level parallelism

Enhanced Intel Hyper Threading, with Dual-Domain Multi-Threading support

Intel Cache Safe Technology

Residual error protection for floating point operations

Thermal logic technologies

Dynamic CKE, for additional power savings with memory DIMMs

Chipset

Intel Boxboro

Memory

Type DDR3 registered memory modules (R-DIMMs)

Minimum 32 GB (8 x 4 GB DIMMs) or (4 x 8 GB DIMMs)

Maximum 1.5 TB (96 x 16 GB DIMMs)

NOTE: Memory kits consist of two (2) DIMMs.

NOTE: Double Chip Spare is enabled in a pairs DIMMs.

NOTE: Memory must be loaded in quads (two memory kits, 4 DIMMs)

NOTE: Each hard partition (nPar) requires at least one (1) quad of memory DIMMs

Standard Features

Network Adapter

Sixteen (16) Integrated HP NC553i 10Gb FlexFabric adapter ports supporting 10Gb/1Gb autosensing Ethernet, FCoE, Flex-10 and TCP/IP offload engine

NOTE: FlexFabric capability requires OS drivers and the use of an HP Virtual Connect FlexFabric module. Learn more at: www.hp.com/go/virtualconnect

NOTE: BL8x0c i4 server blades require Virtual Connect 3.70 or later when used in Virtual Connect configurations

One (1) additional 10/100 NIC dedicated to Integrity iLO 3 Management

NOTE: Up to thirty-two additional Gigabit Ethernet ports via the NC364m Quad-port mezzanine adapter, or sixteen additional 10 Gigabit Ethernet ports via the NC532m dual-port mezzanine adapter.

Expansion Slots

Twelve Mezzanine slots, eight (8) Type II and four (4) Type I, PCIe x8 Gen2

Integrated Manageability

Integrity Integrated Lights-Out 3 (iLO 3)

Factory installed Integrity iLO 3 Advanced Pack License

HP BladeSystem c-Class Onboard Administrator

HP BladeSystem c-Class Virtual Connect

Storage Controller

Four (4) HP Smart Array p410i 3Gb SAS Controller

8 SAS Channels (one to each HDD)

Supports RAID 1, RAID 0, and HBA mode options

Four (4) Embedded SAS read only 512MB cache, one per HP Smart Array p410i Embedded SAS Controller

Maximum Internal Storage

Hot Plug SAS

7.2TB SAS

8 x 900GB SAS

Graphics

Integrated ATI RN50 1280 x 1024 x 16M color (128 MB DDR memory)

Resolution Color Depths

Depths 1280 x 1024, 16.7M, 64k, 256, 16
1024 x 768, 16.7M, 64k, 256, 16
800 x 600, 16.7M, 64k, 256, 16
640 x 480, 16.7M, 64k, 256, 16

FlexFabric Support

Sixteen (16) ports via Eight (8) Embedded HP NC553i 10Gb 2-port FlexFabric Converged Network Adapters integrated on system board.

Dual (2) ports via HP BLc NC553m Dual Port FlexFabric 10Gb Converged Network Adapter

Dual (2) ports via HP BLc NC551m Dual Port FlexFabric 10Gb Converged Network Adapter

NOTE: BL8x0c i4 server blades require Virtual Connect 3.70 or later

NOTE: Each port supports 10GbE Ethernet or 8Gb FCoE traffic.

NOTE: Please see the QuickSpecs for Technical Specifications and additional information and for HP-UX support.

HP NC551m: http://h18004.www1.hp.com/products/quickspecs/13649_div/13649_div.html

HP NC553m: http://h18004.www1.hp.com/products/quickspecs/13737_div/13737_div.html

Standard Features

InfiniBand Support

Optional InfiniBand HCAs are supported by the HP Integrity BL860c i4 Server Blade. The mezzanine circuit board connects directly to the server blade system board.

HP 4X QDR InfiniBand ConnectX-2 Dual Port Mezzanine HCA for c-Class BladeSystem (PN 592519-B21)

Features:

- Negotiates to DDR/QDR speeds
- Dual ports for redundant path connections
- Support for HP-UX 11i v3
- Supported with HP 4X QDR InfiniBand Switch Module for c-Class BladeSystem (PN 489184-B21).
- For details specifications, please visit:
<http://www.hp.com/products1/serverconnectivity/adapters/infiniband/specifications.html>

Fibre Channel Support

Optional Fibre Channel HBAs are supported by the HP Integrity BL890c i4. The mezzanine circuit board connects directly to the server blade system board.

8Gb Fibre Channel Host Bus Adapters:

- QLogic QMH2562 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem (PN 451871-B21)
- Emulex LPe1205 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem (PN 456972-B21)

8Gb Fibre Channel HBAs feature:

- 8/4/2/1Gb/s auto negotiating speeds
- Dual ports for redundant path connections
- Optimized for HP Storage and supported by third party SAN vendors
- Support for HP-UX 11i v3, Microsoft® Windows for Integrity (6.2)

Compatible SAN

HP Integrity BL890c i4 server blades are optimized for HP Storage MSA, EVA, and XP products.

Smart Array Controller Support

Optional Smart Array Controller is supported by BL890c i4. The mezzanine circuit board connects directly to the server blade system board, and provides connection to off-blade SAS storage via a SAS interconnect switch module in the HP BladeSystem enclosure.

HP Smart Array P711m/1G FBWC 4-ports Ext PCIe x8 6G SAS Controller (PN 513778-B21)

- Provides support for HP Zoned Storage for BladeSystem
- Zoned Storage solution requires compatible HP Storage 600 Modular Disk System and HP Storage 3Gb SAS BL Switch
- Supports RAID 6 with Advanced Data Guarding (ADG)
- Provides support for HP P2000 G3 MSA
- Support for HP P2000 G3 MSA requires HP Storage 6Gb SAS BL Switch

NOTE: For additional details please see:

http://h18004.www1.hp.com/products/quickspecs/14035_div/14035_div.html

Standard Features

HP USB Options

External USB DVD drive with 7 ft USB extension cable is supported with c7000 enclosures.

The solution includes the following components:

- External USB DVD drive with 9-inch USB cable
- Power adaptor, power cable and USB Y-connector
- 7-foot USB extension cable

NOTE: The USB Y-connector goes between the extension cable (SH046AA) and the 9-inch USB cable fixed with DVD drive.

NOTE: The Y-connector should NOT be placed between the server blade and the 7-foot Extension cable.

Integrity Server Blades Management Software and HP Integrity Essentials Software Plugins

HP-UX 11i Management Software for HP Integrity BL890c i4 Server Blade and HP BladeSystem

• Getting Started

- HP Systems Insight Manager
- HP Insight Control for HP-UX 11i
- HP-UX 11i System Management
- HP BladeSystem Integrated Manager in HP System Insight Manager
- HP Onboard Administrator
- HP BladeSystem c-Class Onboard Administrator Firmware
- HP BladeSystem c-Class Virtual Connect Firmware
- HP Insight Control for HP-UX 11i v3 (included in BASE OE)

• Deploy

- HP Ignite-UX
- Software Distributor-UX
- Software Package Builder
- Dynamic Root Disk (DRD)

• Monitor

- HP Systems Insight Manager
- HP System Management Homepage
- Glance Plus Pak
- Performance Manager and Agent
- HP Serviceguard Manager

• Control

- HP Integrity Integrated Lights-Out (iLO) 3 (standard with BL890c i4 servers)
- Integrity iLO Advanced 3 Pack License (included with BL890c i4 servers)

• Protect

- HP-UX Bastille
- HP Containers
- Data Protector Software
- Software Assistant (SWA)

• Optimize

- HP Capacity Advisory
- HP Global Workload Manager
- Process Resource Manager
- HP Insight Power Manager
- HP-UX 11i v3 power management

• Provision

Standard Features

- HP Matrix OE - Matrix OE infrastructure orchestration
- **Integrate**
 - HP Business Technology Optimization
 - IT Management Software
 - HP Matrix OE - Matrix OE for HP Integrity server blades
- **Learn More**
 - For additional information on HP Integrity server blade management software please visit:
<http://h18004.www1.hp.com/products/servers/integrity-bl/class/860c/compmatrix.html>

Glossary of Integrity Server Blades Management Software Product Description

HP BladeSystem Integrated Manager in HP Systems Insight Manager	The HP BladeSystem Integrated Manager is a component in HP Systems Insight Manager (SIM) that provides streamlined management for the entire HP BladeSystem product family. The HP BladeSystem Integrated Manager enables users to quickly navigate their HP blade environments including blade servers, enclosure infrastructures, racks, and integrated switches, via automatically generated blade rack picture views and hierarchical trees. Users are able to conveniently configure, deploy, and manage individual or groups of blade systems. Additionally, users are able to quickly set up logical collections of blade systems for convenient management and control.
HP Blades Visualization	Used by System Administrators to identify, associate and group blades into collections, using tables, trees, and picture views, and it can also be used to monitor performance and launch Integrity Essentials. NOTE: For more information about Manageability solutions for Integrity Servers go to: http://h20341.www2.hp.com/integrity/w1/en/software/essentials-overview.html
HP GlancePlus Pak	HP GlancePlus Pak provides you with a single product for managing a system's availability and performance. It is an integrated product that includes HP GlancePlus. As an integrated product, the GlancePlus Pak includes the real-time diagnostic capabilities of GlancePlus and the historical data collection capabilities of the Performance Agent. The performance agent is used with other availability and performance management products, thus providing an integrated real-time and historical performance management solution.
HP Ignite-UX for HP-UX Deployments	HP Ignite-UX is a free toolset that enables a network install of HP-UX onto multiple PA-RISC and/or Integrity servers on a network. It can also be used to create custom install configurations, or golden images, recover systems remotely, create custom recovery media including tape, CD and DVD, and manage and monitor multiple client installation sessions.
HP Capacity Advisor	The capacity planning component of HP Matrix OE - , HP Capacity Advisor offers the industry's first lightweight, integrated tool for ongoing capacity planning by simulating the placement of application workloads to help IT administrators improve server utilization. It captures real-world server utilization data to pre-test different scenarios before making changes to critical applications. HP Virtualization Manager, which is included with Capacity Advisor and Global Workload Manager, provides a central point of control that allows you to manage all the resources in your virtualized environment and a powerful way to connect IT resources to real business needs.
HP Integrity Integrated	HP Integrity Integrated Lights-Out (iLO) management processors make it

Standard Features

Lights-Out (iLO) 3 (factory integrated with BL890c i2) simpler, faster, and less costly to remotely manage your Integrity servers. HP iLO functions without additional software and can be accessed from any location via a web browser. HP Integrity systems with iLO 3 ships with a built in Advanced Pack License so your Integrity blade is instantly ready to use iLO Virtual Media and iLO power measurement. Integrity iLO Advanced features enabled in this release: Virtual Media, LDAP directory services, nPartitions management, iLO power measurement, and integration with Insight Power Manager. No additional iLO licensing is needed.

NOTE: Please see www.hp.com/go/integrityilo for more information

HP Onboard Administrator The Onboard Administrator for the HP BladeSystem enclosure is the brains of the c-Class infrastructure. Together with the enclosure's HP Insight Display, the Onboard Administrator has been designed for both local and remote administration of HP BladeSystem c-Class. This module and its firmware provides:

- Wizards for simple, fast setup and configuration
- Highly available and secure access to the HP BladeSystem infrastructure
- Security roles for server, network, and storage administrators
- Automated power and cooling of the HP BladeSystem infrastructure
- Agent-less device health and status
- Thermal Logic power and cooling information and control

NOTE: Please see: <http://www.hp.com/go/onboardadministrator> for more information.

HP Serviceguard Manager HP Serviceguard Manager (included with the Serviceguard product) is a graphical user interface (GUI) that provides configuration, administration, and monitoring capabilities for Serviceguard, Serviceguard Extension for Oracle RAC, Metrocluster, and Continentalclusters. Using Serviceguard Manager, operators see color-coded icons that provide a big-picture view of multiple clusters. From this big-picture view, operators can drill down and proactively manage clusters, systems (nodes), and packages that run applications.

HP Systems Insight Manager HP Systems Insight Manager (HP SIM) provides a unified, secure and extensible environment to centrally manage servers, storage and other infrastructure devices across multiple operating system platforms.

HP System Management Homepage HP System Management Homepage is a web-based interface that consolidates and simplifies the management of individual ProLiant servers running Microsoft Windows or Linux operating systems, or HP 9000 and HP Integrity servers running [HP-UX 11i](#). By aggregating data from HP Insight Management Agents and other management tools, the System Management Homepage provides a secure and intuitive interface to review in-depth hardware configuration and status data, performance metrics, system thresholds and software version control information. The System Management Homepage can also be used to access the HP Lights-Out Management processor on ProLiant and Integrity servers.

Standard Features

HP Matrix OE for HP Integrity servers	HP Matrix OE is advanced lifecycle management software for HP Integrity servers which enables you to instantly adjust to dynamic business demands – with the new addition of infrastructure orchestration, not only can you easily plan, configure, and automate your physical and virtual resources in the same way, but now you can also provision and modify a complex infrastructure in minutes.
HP-UX Software Assistant (SWA)	HP-UX Software Assistant (SWA) is a command-line based tool that consolidates and simplifies patch management and security bulletin management on HP-UX systems. The SWA tool is new for HP-UX releases as of January 2007, includes Security Patch Check (SPC), and is the HP-recommended utility to use to maintain currency with HP-published security bulletins for HP-UX software.
HP-UX Workload Manager	HP-UX Workload Manager (HP-UX WLM) is a resource management tool that provides automatic processor resource allocation and application performance management based on your service-level objectives (SLOs) and business priorities. WLM is most effective managing applications that are processor-bound. It automatically adapts system or partition CPU resources (cores) to the demands, SLOs, and priorities of the running applications. (A core is the actual data processing engine within a processor, where a single processor can have multiple cores, and a core can support multiple execution threads through Hyper-Threading, introduced with HP-UX 11i v3, as discussed below.) It adjusts the CPU allocation of a group of processes known as a workload, basing adjustment on the current needs and performance of the applications in that workload.
HP Global Workload Manager	The workload management capability for HP Integrity servers is provided by the HP Global Workload Manager component of HP Insight Dynamics – VSE. HP Global Workload Manager (gWLM) is an intelligent policy engine that automatically allocates resources among multiple workloads to increase server utilization while meeting service levels for high-priority applications. Designed to work across multiple HP-UX 11i, OpenVMS and Linux environments, the workload management features are ideal for large, centralized IT environments that host applications for many departments.
HP Matrix OE	HP Matrix OE capabilities let you provision infrastructure in minutes to automatically activate physical and virtual servers, storage, and networking from pools of shared resources. Whether you need a single virtual machine or infrastructure for a complex three-tier application, Matrix OE finds available resources, streamlines the approval process, and automatically provisions and configures what's needed across infrastructure silos. Delivering infrastructure to the business becomes faster, more efficient, and more reliable.
Performance Manager and Agent	HP Performance Manager, Agents, and Monitor combine to provide a powerful and flexible distributed management solution. This solution is a single interface for centrally monitoring, analyzing, and forecasting resource utilization for distributed multi-vendor environments, enabling you to offer the best possible level of service in a cost-effective manner.
Process Resource Manager	HP Process Resource Manager (HP PRM) is a resource management tool used to control the amount of resources that processes use during peak system load. HP PRM can manage allocation of the following resources: ● CPU: Ensures a minimum allocation of CPU; can also simultaneously cap

Standard Features

	CPU resource usage for each group in the configuration. (Starting with HP-UX 11i v3, per-group capping is available.) • Memory: Ensures a minimum allocation of private real memory; can also cap private memory usage. Allows you to allocate an exact amount of shared memory. • Disk bandwidth: Ensures a minimum allocation of disk bandwidth
HP Containers	One method that Matrix OE uses to improve server resource utilization is to consolidate multiple applications within a single operating system image. HP-UX Containers combine kernel level security and prove resource management to stack multiple applications within the same operating system. HP-UX Containers and HP-UX Workload Manager can dedicate specific resources to specific applications within an operating system image, avoiding resource contention issues. Using HP-UX Containers 11i v3 Security Containment, organizations can ensure that application instances cannot access processes or file from other applications or the system. This ensures that multiple application instances run securely in a consolidated environment, providing the benefits of consolidation while preserving the security of a scale out environment. For software licensing purposes, the maximum number of CPUs in HP-UX Containers can be capped. This capability is part of the HP-UX Base Operating Environment (BOE).
Software Distributor-UX	Software Distributor (SD) is the HP-UX administration tool set used to deliver and maintain HP-UX operating systems and layered software applications. SD is delivered as part of HP-UX; you do not need to download it separately.

Insight Control for BladeSystem Management

Insight Control for BladeSystem delivers foundation management for HP BladeSystem lifecycles, including hardware resource deployment, health monitoring, software version control, performance monitoring, and power management.

Integrity blades are supported with the following ICE components, installed automatically when using the wizard-based integrated installer:

- HP Systems Insight Manager
- Extensions for SIM on Microsoft Windows CMS (to manage HP-UX)
- HP BladeSystem Integrated Manager
- Insight Power Manager

NOTE: For Licensing and Packaging Options please see the options section of this QuickSpecs.

NOTE: Insight Control Environment for BladeSystem is delivered with HP BladeSystem c-Class enclosures with either 8 or 16-server licenses, or 8 server evaluation licenses (30-days). For additional information on HP BladeSystem c-Class Infrastructure please visit: HP BladeSystem c-Class Infrastructure QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/12517_div/12517_div.html

NOTE: For additional product and licensing information about Insight Control Environment, HP Systems Insight Manager and Essentials software refer to: <http://www.hp.com/servers/proliantessentials>.

Standard Features

OS Support

HP-UX 11i v3 Data Center Operating Environment (DC-OE)
HP-UX 11i v3 Virtual Server Environment (VSE-OE)
HP-UX 11i v3 High Availability Environment (HA-OE)
HP-UX 11i v3 Base Operating Environment (BOE)

NOTE: For more complete and up to date information on HP-UX 11i support, please visit the HP-UX 11i website at: <http://www.hp.com/go/hpux11ibldes>.

Supported Software Options

HP Matrix OE for HP Integrity servers (which is included in HP-UX VSE-OE and DC-OE) includes the following capabilities:
HP-UX Virtual Partitions (vPars) v6.1
HP Integrity Virtual Machines (VM)
HP Capacity Advisor
HP Global Workload Manager
HP Integrity Online VM Migration
HP Virtualization Manager
HP Serviceguard for HP-UX 11i
HP Serviceguard Manager
HP Serviceguard Extensions for SAP
HP Serviceguard Extensions for Oracle
HP Insight Control power management
GlancePlus Pak
Performance Manager and Agent
HA Monitors
MirrorDisk/UX

Intelligent Manageability

HP Integrity Integrated Lights-Out (iLO 3) Remote Management

Virtual serial console (Multiple, mirrored sessions, with previous context and console log buffer)

Virtual Media

Virtual Power Button Control

LDAP Directory Services

iLO 3 power management integration with Insight Power Manager

Embedded system health and Integrity fault management Diagnostics and troubleshooting:

- virtual front panel
- log access to Integrity System Event Log
- Forward Progress Log Blade power consumption reading

Dedicated LAN Connectivity

Automatic IP Configuration via DHCP/DNS/WINS browser

Command Line and scripted access Industry Standard RC4, 128-bit Secure Sockets Layer (SSL) and Secure Shell (SSH) Security

Directory Services Integration (LDAP)

Support for 19 user accounts with customizable access privileges

NOTE: iLO 3 Advanced Pack license is included with every BL890c i4 server blade.

Standard Features

Availability

Dual-Port Fibre Channel Mezzanine Card for redundant SAN connection
Eight hot-plug SAS hard drive bays and four (4) integrated RAID (HP p410i) controllers on every server blade

Network adapter teaming (network fault tolerance, transmit load balancing, switch-assisted load balancing) supported on integrated LOMs and with add-in Mezzanine cards.

- ECC protected DDR3 memory
- Memory double chip spare to overcome two DRAM chip failures
- Dynamic Processor resilience and deallocation with HP-UX
- Journal file system with HP-UX*
- Auto reboot
- HP Serviceguard for HP-UX*
- HP Serviceguard Extension for RAC for HP-UX*
- HP Serviceguard Extension for SAP for HP-UX*
- Serviceguard Manager for HP-UX Clusters*
- HP Event Monitoring Service
- HA Monitors for HP-UX
- HA Toolkits for HP-UX
- HP Mirrordisk/UX* (Included if purchase HP-UX 11i VSE, DC, or HA OEs)
- Extended Campus Cluster*, HP Metrocluster*, and HP Continentalclusters* for HP UX
- HP System Insight Manager (SIM) for proactive fault management
- HP Serviceguard Storage Management Suites for HP-UX*

NOTE: *Fee based software products

Security

Hardware Security

- Administrator's password
- Integrity iLO 3 access control- 19 customizable local user accounts with assignable rights for power, console, configuration, etc.
- OA and Integrity iLO 3 Directory Services Integration (LDAP)
- Integrity iLO 3 access via SSL encryption or SSH
- Integrity iLO 3 access methods via web, SSH, etc. can be disabled
- SSL encryption on web console
- Trusted Platform Module (TPM) option for secure cryptographic key storage, integrates with HP-UX security features

Platform security fundamentals

For the past 25 years HP has been building one of the most trustworthy and secure UNIX operating systems on the market. Designed for the optimal protection against both external and internal threats. HP-UX 11i offers industry-leading breadth and depth of UNIX security features. Focused on comprehensive security integration aimed at proactively mitigating risk, reducing compliance cost and accelerating time to implementation, HP-UX security solutions significantly lower IT costs. This set of fully integrated and complementary features is designed to provide layered security with in-depth protection of all your enterprise assets by protecting all these aspects of data, systems, data and identity security. HP-UX independently validates its comprehensive security portfolio through Common Criteria security evaluations. For more details, visit www.hp.com/go/hpux11isecurity

Standard Features

Protecting systems:

One critical factor in enterprise security is system minimization and hardening. HP-UX 11i offers a set of security features designed to address known and unknown vulnerabilities by running only the services that are needed, thus minimizing a potential point of attack. The following security features have built-in mechanisms not only to minimize and harden the system, but also to detect and react to attack in real time:

- Bastille system hardening
- Host Intrusion Detection System
- Secure Resource Partitions
- IPFilter - firewall technology
- Software Assistant (security bulletin currency)
- Install-time Security
- Boot Authentication
- Standard Mode Security Extensions
- Shadow Passwords
- Strong Random Number Generator

Protecting data:

HP-UX 11i offers data protection in many forms: protecting data in transit, in use and at rest. By using security features designed to protect data in its three forms, HP-UX 11i customers can minimize possible breaches not only in terms of data loss, but in customer trust as well. Several security features offer data protection capabilities to HP-UX customers:

- Encrypted volume and file system
- Trusted Computing Services
- Security containment
- OpenSSL
- IPSec
- Secure Shell
- MD5sum

Protecting Identity:

In modern day global enterprise companies, managing identity is not an easy task, especially as identity management requirements grow to include employees, contractors, partners and suppliers across many countries with various privacy protection laws and regulation. HP-UX 11i dramatically simplifies this critical task by integrating various identity management technologies which offer ease of use and adherence to compliance regulation:

- Identity Management Integration
- Select Access for IdMI
- Role-based Access Control
- AAA Server
- HP Directory Server for HP-UX
- LDAP-UX Client
- Kerberos Server
- Kerberos Client Services
- PAM Kerberos

NOTE: HP also offers many additional security features available through open source software for HP-UX.

Standard Features

Common Criteria certification

Many enterprise and government customers require this vendor-independent security certification because it increases confidence in the product's security assurance, functionality, quality and effectiveness. Many governments, including the United States, require certification for government IT procurement.

Certification evaluations are only conducted by the evaluation agency after release of the product. HP-UX 11i v3 has been actively evaluated to the Common Criteria (CC) Security standards for many years. A history of our achievements include:

- February 2003: Certification of HP-UX 11i V1 achieves A CC to Evaluation Assurance Level 4
- May 2006: Certification of HP-UX 11i V2 to the current EAL4 Common Criteria
- May 2008: Certification of HP-UX 11iV3 achieved including hard partitions (nPars)
- December 2009: Certification of HP-UX 11iV3 to CCOPP profile including soft partitions (vPars)

Common Criteria certifications continue to be an integral part of our HP-UX comprehensive security portfolio. HP-UX 11i v3 has successfully completed a new Commercial off the Shelf (COTS) Compartmentalized Operations Protection Profile (CCOPP) evaluation. This new CCOPP evaluation encompasses the extensive range of security solution for HP-UX 11i v3 including soft partitioning or Virtual partitions (vPars) as well as the previously certified hard partitions (nPars).

Factory Express Portfolio for Servers and Storage

HP Factory Express offers configuration, customization, integration and deployment services for HP servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging, and custom packaging. HP products supported through Factory Express include a wide array of servers and storage: HP Integrity, HP ProLiant, HP Integrity Server Blades, HP ProLiant Server Blades, HP BladeSystem, HP 9000 servers as well as the MSA1xxx, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches.

For more information on Factory Express services for your specific server model please contact your sales representative or go to: <http://www.hp.com/go/factory-express>.

HP Simple Configurator

SCE is a guided self service tool to help sales and non technical people provide customers with initial configurations in 3 to 5 minutes. You may then send the configuration on for configuration help, or use in your existing ordering processes. If you require "custom" rack configuration or configuration for products not available in SCE, please contact HP's Customer Business Center or an Authorized Partner for assistance. <http://www.hp.com/products/configurator>

Standard Features

Service and Support

HP Care Pack Services are available for the HP Integrity BL890c i4 server blade. These services offer integrated hardware and software support to help customers maintain a robust, stable, flexible IT environment that enhances their business agility. They encompass today's most popular products, including UNIX, Windows and Linux servers, as well as mobile technology, network devices, desktops, printers, storage solutions, management software and more.

All of these Service offerings let customers leverage HP Services multi-vendor, multi-technology experience and expertise; global reach with delivery capabilities; single-point-of-contact problem diagnosis and resolution; advanced remote monitoring and performance enhancement technologies; and proven support management processes based on IT best practices.

HP Services professionals can help customers identify the Premium support offering that fits their business and technology goals. HP Services include:

- **HP Critical Service** - comprehensive preventive services and super-responsive support to maximize availability and minimize downtime risk exposure in mission-critical environments
- **HP Proactive 24 Service** - collaborate with HP Services professionals to improve operational effectiveness, performance, and stability through joint services planning and 24x7 hardware/Software Support
- **Support Plus 24** - 24x7x365 onsite hardware and over-the-phone Software Support for HP and selected multi vendor products, plus software updates at substantial subscription savings
- **Support Plus** - the economical choice for single-source hardware/Software Support delivered during extended business hours, as well as cost-saving software updates

These products are covered by a global limited warranty and supported by HP Services.

A complete range of HP Care Pack services are available including:

- Proactive Select - a cost effective method of buying service credits up front to be used for consultancy and service options as needed
- Installation and start up
- Education courses
- Extended onsite hardware coverage hours from same business day 13 hours, 5 day to 24 hours, 7 days call window with options including 4-hour response or 6-hour Call To Repair
- Comprehensive range of software technical support.

NOTE: For more information regarding the Blade service portfolio visit our worldwide web site on the internet at: <http://h20219.www2.hp.com/services/cache/81725-0-0-225-121.html>

HP Services for the c7000 Enclosure cover the enclosure, power supplies and fans. HP qualified rack options are covered by these services when installed within the same rack. HP Supported Ethernet devices covered include the Ethernet Pass-Through Module, Fibre Channel Pass-Through Module and GbE2c Ethernet Blade Switch and Cisco Catalyst 3020 Blade Switch.

For a complete listing of service offerings and information visit:

<http://www.hp.com/services/blade-systems-services>

<http://www.commoncriteriaportal.org/files/epfiles/hp-ux11iv2.pdf>.

Support Services

HP Technology Services—consultants and support experts to solve your most complex infrastructure problems. We help keep your business running, no matter what. Boost availability and avoid downtime, trust our expertise to optimize your HP solution.

HP Care Pack Services: Packaged server and storage services for increased uptime, productivity and ROI

When you buy HP server and storage products and solutions, it's also a good time to think about what levels of support you may need. Our portfolio of service options reduce deployment and management worries while helping you get the most out of your server and storage investments. We take a holistic approach to your environment, bridging servers, blades, storage, software and network infrastructures with our packaged HP Care Pack Services for servers and storage.

Protect your business beyond warranty

When it comes to robustness and reliability, standard computing equipment warranties have matured along with technology. Good news that can also create problems stemming from depending on standard warranties designed to only protect against product defects and some downtime causes. Using a standard approach to warranty uplifts, such as HP Care Pack Services, helps reduce downtime risks and provides operational consistency for mission-critical and standard business computing.

HP Care Pack Services: Upgrading or extending standard server and storage warranties cost effectively

HP Care Pack Services offer a standard reactive hardware and software support services suite sold separately, or combined with our Support Plus and Support Plus 24 services. The portfolio also provides a combination of integrated proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition with HP Proactive Select, you can acquire the specific proactive constancy and technical services. HP Proactive Select menu offers a broad set of service options that you can mix and match depending on your specific requirements. Proactive service options include offers for server, storage, network, SAN device, software, environment and education services.

HP server and storage lifecycle support services offers a full spectrum of customer care—from technology support to complex migrations to complete managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education Services offer flexible, comprehensive training on to help your IT staff get the most out of your server and storage investments. HP Financial solutions extend innovative financing and cost-effective asset management programs—from purchase to equipment retirement. Depending on a customer's individual support needs, customers' can choose from three conveniently structured support solutions. The support recommendations listed below generally apply to the server and the complete system. Options should be covered at the same service level as the associated installed system.

Choose the right level of support, deployment and professional integration services for your requirements and expectations: Learn more: www.hp.com/services/servers and www.hp.com/services/storage

NOTE: Care Pack Services availability may vary by product and country.

Support Services

Recommended HP Care Pack Services for optimal satisfaction Integrity Servers:

Optimized Care

3-Year HP Critical Service:

HP Critical Service (CS) provides a complete support solution designed for businesses that run essential mission-critical applications, which cannot tolerate downtime without a significant business impact. This 3-year, comprehensive service provides the right combination of proactive and reactive support designed to improve availability and performance across your IT infrastructure. With fewer interruptions and less downtime, you will lower costs and gain competitive advantages in the marketplace. HP Critical Service provides highly-trained professionals with world-class skills and a commitment to understand both your enterprise technology requirements and your business objectives. In today's new era of business technology, technology must produce thousands of business outcomes. Today's HP Technology Services portfolio helps customers manage their technology in action—because when technology works, business works.

- Boost business productivity through increased availability and decrease business losses caused by IT downtime
- Reduce risk and improve efficiency by proactively managing changes across the environment with no interoperability gaps
- Resolve complex problems quickly through direct access to HP Services expertise and support from a team familiar with business and technology infrastructure
- Free IT staff to focus on strategic business issues and increase customer satisfaction

<http://h20195.www2.hp.com/v2/GetPDF.aspx/5982-0079EN.pdf>

HP Factory Express Package 5 Service: HP designed Solution

HP Factory Express Service Package 5 provides you with all of the configuration, racking, and installation services of Packages 3 and 4, along with advice and technical assistance. Utilize this service if you want help in designing your solution. HP Factory Express Service Package 5 allows you to leverage HP's factory capabilities along with those of an HP services consultant and field delivery specialist to deliver a solution that helps address your unique needs and requirements.

The service is recommended if you want to benefit from HP's design and configuration skills by having an HP consultant work directly with you to recommend and develop technical specifications for the solution that will help address your performance and availability goals.

Service benefits

- An HP-designed and configured solution based on accurate data that you provide to HP about your requirements
- Dedicated team engagement and collaboration with you from planning through implementation
- Enhanced IT resources and operations
- A solution designed by a team of HP engineering specialists to your specifications in accordance with ISO 9000: 2000 quality standards and then built, tested, shipped, and deployed with skilled onsite deployment assistance
- An HP-designed and configured solution based on accurate data that you provide to HP about your requirements
- Dedicated team engagement and collaboration with you from planning through implementation
- Enhanced IT resources and operations
- A solution designed by a team of HP engineering specialists to your specifications in accordance with ISO 9000: 2000 quality standards and then built, tested, shipped, and deployed with skilled onsite deployment assistance

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-9994EN.pdf>

Standard Care

3-Year HP Proactive 24

As an alternative to our recommended support level, for customers who want enhanced operational effectiveness and proactive

Support Services

problem identification:

HP Proactive 24 Service (P24) integrates hardware and software support to help you improve the stability and operational effectiveness of your IT environment. An HP Account Manager acts as your primary point of contact to ensure that HP meets your support needs effectively.

P24 provides the maximum value when multiple technologies in the environment (e.g. servers, storage, SAN and the network), are all covered. It provides an environment-wide view and consistent support of all of these components which affect stability of your key applications.

Choose P24 when you want to:

- enhance operational effectiveness with proactive problem identification and recommendations from HP
- partner with technical experts who help coordinate support, provide hands-on assistance, and share knowledge with your staff
- rapidly access support and expertise spanning your environment
- obtain personalized services tailored to your business environment and critical success factors
- anticipate necessary change - and execute it correctly the first time
- efficiently manage infrastructure resources to meet your performance objectives

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA0-1614ENN.pdf>

Server Installation

HP provides onsite new hardware installation and software deployment of the Blade server. HP provides configuration and testing of BladeSystem Ethernet interconnect switches, facilitating proper implementation of network protocols and access to advanced features.

Basic Care

3-Year HP Support Plus 24

For a higher return on your server and storage investment, HP Support Plus 24 provides integrated hardware and software support services designed specifically for your technology. Available 24x7, this 3-year combined reactive support option delivers onsite hardware support and over-the-phone software support around-the-clock. Leverage the full strength of HP Technology Services - customers can trust the services professionals at HP to work collaboratively with them, putting our strategic and technical know-how to work across their entire infrastructure.

- Improve uptime with responsive hardware and software services
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP software at a predictable cost
- Increase customer satisfaction-with no interoperability gaps

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EN.pdf>

Server Installation

HP provides onsite new hardware installation and software deployment of the Blade server. HP provides configuration and testing of BladeSystem Ethernet interconnect switches, facilitating proper implementation of network protocols and access to advanced features.

Relate Services

HP Proactive Select Service



Support Services

For customers that need the flexibility of choosing from a variety of service activities ranging from assessments, performance analysis, firmware management, and infrastructure solution support to technical forums. These service activities cover a broad spectrum of IT technology domains including servers, blades, operating systems, storage, SANs, networks, third party software, virtualization, power and cooling, management software, security and ITSM. The end result is a solution that is designed by you to help you meet your IT and business goals. Customers can buy Proactive Select Service Credits when you purchase your hardware and then use the credits over the next 12 months.

Service benefits

HP Proactive Select services help you to:

- Access a list of flexible and customizable proactive service activities
- Choose from a variety of service activities addressing both technology and process needs
- Have the ability to change the Plan during the review meeting
- Enhance your in-house IT team with complementary assistance from HP
- Improve the time to solution
- Reduce business risk and project costs by accessing HP specialists
- Simplify IT operational procedures by leveraging HP best practices

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-4213ENW.pdf>

eSupport

Insight Remote Support

Delivers secure remote monitoring and support for HP servers and storage, 24x7 at no additional cost. Available as part of HP Warranty, Care Pack and Service Contract offers.

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal

The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit

<http://www.hp.com/support>

HP Insight Remote Support software delivers secure remote monitoring and support for your HP Servers and Storage, 24 X 7, so you can spend less time solving problems and more time focused on your business. You can have your systems remotely monitored for hardware failure using secure technology that's been proven at thousands of companies around the world. In many cases, you can

Support Services

avoid problems before they occur.

Models

Base Models

**HP Integrity BL890c i4
Base Unit for c7000
Enclosure**
AM380A

**HP Integrity BL890c i4
Base Unit for c3000
Enclosure**
AM381A

Processor(s)
Supports up to eight (8)
processors

Cache Memory
All processor models

Memory

Network Adapter

Storage Controller

Hard Drives

IO expansion

Optical Drive

Integrity iLO 3

Form Factor

Eight (8) processor sockets, processor modules are configured to order

Included with processor

Ninety six (96) DIMM sockets; memory DIMMs are configured to order

Sixteen (16) integrated HP NC553i 10Gb FlexFabric adapter ports supporting 10Gb/1Gb autosensing Ethernet, FCoE, Flex-10, and TCP/IP offload engine

NOTE: FlexFabric capability requires OS drivers and the use of an HP Virtual Connect FlexFabric module. Learn more at: www.hp.com/go/virtualconnect
NOTE: BL8x0c i4 server blades require Virtual Connect 3.70 or later when used in Virtual Connect configurations

One (1) additional 10/100 NIC dedicated to Integrity iLO 3 Management

Four (4) Embedded HP Smart Array p410i SAS Controllers

Four (4) Embedded SAS read only 512MB cache, one per HP Smart Array p410i SAS Controller

Eight SFF SAS drive bays; hard disk drives are configured to order

Twelve (12) PCIe Mezzanine card slots (PCIe Gen2 x8 interface); mezzanine cards are configured to order

None internal to blade server

Integrity iLO 3 and Integrity iLO 3 Advanced Pack license included

Supports 1 BL890c i4 in HP BladeSystem c3000 Enclosure

Supports up to 2 BL890c i4 in HP BladeSystem c7000 Enclosure

Configuration Information - Factory Integrated Models

NOTE: This section lists some of the steps required to configure a Factory Integrated Model. To ensure only valid configurations are ordered, HP recommends the use of an HP approved configurator. Contact your local sales representative for information on CTO product offerings and requirements.

NOTE: HP does not allow factory integration of options into standard models listed above.

Configure-to-order servers must start with a CTO Enclosure

NOTE: FIO indicates that this option is a Factory Installable Option.

Step 1: Choose Required Base Server Blade Configuration

HP Models

HP Integrity BL890c i4 c7000 Server Blade

AM380A

NOTE: Choose the base models.

NOTE: Adding Option code "#0D1" to the Server Blade P/N will integrate the configured blade into the enclosure (which must be on the same order)

NOTE: When adding Option code "#0D1," must select whether server blade should be installed in an odd slot of the c7000 enclosure (AM380A#001) or in an even slot (AM380A#002).

HP Integrity BL890c i4 c3000 Server Blade

AM381A

NOTE: Choose the base models.

NOTE: Adding Option code "#0D1" to the Server Blade P/N will integrate the configured blade into the enclosure (which must be on the same order)

NOTE: When adding Option code "#0D1," must select whether server blade should be installed in an odd slot of the c3000 enclosure (AM381A#001) or in an even slot (AM381A#002).

Base unit standard features:

Sixteen embedded 10 Gigabit Ethernet NIC ports plus (1) additional 10/100 NIC dedicated to Integrity iLO 3iLO 3 Management

Four Integrated HP Smart Array p410i SAS Controller for internal HDDs

Eight small form factor (SFF) SAS hot plug hard drive bays

HP Integrity Integrated Lights-Out 3

Step 2: Choose Required Options (one of the following from each list unless otherwise noted):

HP Processors

NOTE: Select minimum four (4) and maximum eight (8) processors.

Octo-Core Processors

HP BL8x0c i4 Itanium 9540 (2.13GHz/8-core/24MB/170W) Processor Kit

AM383A

HP BL8x0c i4 Itanium 9560 (2.53GHz/8-core/32MB/170W) Processor Kit

AM382A

Quad-Core Processor

HP BL8x0c i4 Itanium 9520 (1.73GHz/4-core/20MB/130W) Processor Kit

AM385A

HP BL8x0c i4 Itanium 9550 (2.4GHz/4-core/32MB/170W) Processor Kit

AM384A

HP Memory

NOTE: Select minimum four (4) and maximum forty eight (48) memory kits.

HP BL8x0c i4 8GB (2x4GB) PCL3-10600 Registered CAS 9 Memory Kit

AM386A

HP BL8x0c i4 16GB (2x8GB) PCL3-10600 Registered CAS 9 Memory Kit

AM387A

HP BL8x0c i4 32GB (2x16GB) PCL3-10600 Registered CAS 9Memory Kit

AM388A

Configuration Information - Factory Integrated Models

NOTE: Memory kits consist of two individual DIMMs.

NOTE: DIMMs must be installed in quads. Therefore, memory kits must be ordered two (2) at a time, to reach quads (4 DIMMS) to be installed.

Step 3: Choose Additional Options for Factory Integration

HP Hard Drives

NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

SAS Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives

HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	619291-B21
HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581286-B21
HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581284-B21
HP 300GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	627117-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507127-B21
HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512547-B21

NOTE: Though the disks are 6Gb, implementation of the embedded HP Smart Array p410i SAS RAID controller limits performance of disks to 3Gb.

6G SAS Hot Plug Enterprise Performance Solid State Drives

HP 200GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632492-B21
HP 400GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632494-B21

HP Ethernet Mezzanine Options

HP NC364m Quad Port 1GbE BL-c Adapter	447883-B21
NOTE: Provides four additional 1GbE ports.	
HP NC360m Dual Port 1GbE BL-c Adapter	445978-B21
NOTE: Provides two additional 1GbE ports.	
HP NC552m 10Gb 2-port Flex-10 Ethernet Adapter	610609-B21
NOTE: Provides Flex-10 connectivity when used in conjunction with the HP Virtual Connect Flex-10 10Gb Ethernet Module for the c-Class BladeSystem Option (P/N 455880-B21).	
HP NC532m Dual Port 10GbE BL-c NIC Adapter Opt Kit	467799-B21
NOTE: Maximum of 8 HP BLc NC532m Adapter Opt. Kits supported per BL890c i4. Provides Flex-10 connectivity when used in conjunction with the HP Virtual Connect Flex-10 10Gb Ethernet Module for the c-Class BladeSystem Option (P/N 455880-B21).	

HP FlexFabric Mezzanine Options

HP BLc NC551m Dual Port FlexFabric 10Gb Converged Network Adapter	580151-B21
HP BLc NC553m Dual Port FlexFabric 10Gb Converged Network Adapter	613431-B21
NOTE: Provides Ethernet and FCoE connectivity when used in conjunction with HP Virtual Connect FlexFabric 10Gb/24-Port Module (PN 571956-B21).	
NOTE: Please see the QuickSpecs for Technical Specifications and additional information:	
HP NC551m:	
http://h18004.www1.hp.com/products/quickspecs/13649_div/13649_div.html	
HP NC553m:	
http://h18004.www1.hp.com/products/quickspecs/13737_div/13737_div.html	

Configuration Information - Factory Integrated Models

HP Fibre Channel Mezzanine Options	HP Virtual Connect FlexFabric Module http://h18004.www1.hp.com/products/quickspecs/13652_div/13652_div.html	
	Emulex LPe1205 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	456972-B21
	QLogic QMH2562 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	451871-B21
	NOTE: BL890c i4 supports HP Virtual Connect Fibre Channel Interconnect Modules. See: http://www.hp.com/go/bladeSystem/virtualconnect for complete details.	
HP Infiniband Mezzanine Options	HP 4X QDR IB CX-2 Dual Port Mezz HCA for HP BladeSystem c-Class	592519-B21
	NOTE: Provides DDR/QDR InfiniBand connectivity when used in conjunction with HP BLc 4X QDR IB Switch for HP BladeSystem c-Class (PN 489184-B21). NOTE: For more support details, please visit the following web-page: http://www.hp.com/products1/serverconnectivity/adapters/infiniband/specifications.html	
HP Security - TPM	HP BL8x0c i4 Trusted Platform Module Kit	AM392A
	NOTE: The TPM must be installed by the factory.	

Step 4: Choose Additional Options for Field Upgrades

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" section below. For additional options, including server blade enclosures interconnect, mezzanine options and power subsystem options; please see the Core Options and Additional sections below; or the following:

HP BladeSystem c-Class Enclosures QuickSpecs:

HP BladeSystem c3000 Enclosure QuickSpecs:

http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html

HP BladeSystem c7000 Enclosure QuickSpecs:

http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html

and HP BladeSystem c-Class Interconnect and Mezzanine Components:

<http://h18004.www1.hp.com/products/bladeSystem/components/c-class-interconnects.html>

<http://h18004.www1.hp.com/products/bladeSystem/components/c-class-adapters.html>

Core Options

HP Ethernet Mezzanine Options	HP NC364m Quad Port 1GbE BL-c Adapter	447883-B21
	NOTE: Provides four additional GbE ports.	
	HP NC360m Dual Port 1GbE BL-c Adapter	445978-B21
	NOTE: Provides two additional GbE ports.	
	HP NC532m Dual Port Flex-10 10GbE BL-c Adapter	467799-B21
	NOTE: Maximum of 8 HP BLc NC532m Adapter Opt. Kits supported per BL890c i4. Provides Flex-10 connectivity when used in conjunction with the HP Virtual Connect Flex-10 10Gb Ethernet Module for the c-Class BladeSystem Option (P/N 455880-B21).	
	HP NC552m 10Gb 2-port Flex-10 Ethernet Adapter	610609-B21
	NOTE: Provides Flex-10 connectivity when used in conjunction with the HP Virtual Connect Flex-10 10Gb Ethernet Module for the c-Class BladeSystem Option (P/N 455880-B21).	
HP FlexFabric Mezzanine Options	HP BLc NC551m Dual Port FlexFabric 10Gb Converged Network Adapter	580151-B21
	HP BLc NC553m Dual Port FlexFabric 10Gb Converged Network Adapter	613431-B21
	NOTE: Provides Ethernet and FCoE connectivity when used in conjunction with HP Virtual Connect FlexFabric 10Gb/24-Port Module (PN 571956-B21).	
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information:	
	HP NC551m:	
	http://h18004.www1.hp.com/products/quickspecs/13649_div/13649_div.html	
	HP NC553m:	
	http://h18004.www1.hp.com/products/quickspecs/13737_div/13737_div.html	
	HP Virtual Connect FlexFabric Module	
	http://h18004.www1.hp.com/products/quickspecs/13652_div/13652_div.html	
HP Fibre Channel Mezzanine Options	Emulex LPe1205 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	456972-B21
	QLogic QMH2562 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	451871-B21
HP Processors (field upgrade only)	Octo-Core Processors	
	HP BL8x0c i4 Itanium 9540 (2.13GHz/8-core/24MB/170W) Processor Kit	AM383A
	HP BL8x0c i4 Itanium 9560 (2.53GHz/8-core/32MB/170W) Processor Kit	AM382A
	Quad-Core Processors	
	HP BL8x0c i4 Itanium 9520 (1.73GHz/4-core/20MB/130W) Processor Kit	AM385A
	HP BL8x0c i4 Itanium 9550 (2.4GHz/4-core/32MB/170W) Processor Kit	AM384A
	NOTE: HP Integrity BL890c i4 processor upgrade kits contain one processor. Processors must be identical. No mixing of processor models is allowed.	
	NOTE: The Integrity BL890c i4 only supports 4, 6, or 8 processor configurations.	

Core Options

HP Memory

HP BL8x0c i4 8GB (2x4GB) PCL3-10600 Registered CAS 9 Memory Kit	AM386A
HP BL8x0c i4 16GB (2x8GB) PCL3-10600 Registered CAS 9 Memory Kit	AM387A
HP BL8x0c i4 32GB (2x16GB) PCL3-10600 Registered CAS 9 Memory Kit	AM388A

NOTE: Memory kits consist of pairs of DIMMs

DIMMs must be installed in quads. Therefore, memory kits must be ordered two (2) at a time, to reach quads (4 DIMMs) to be installed.

NOTE: DIMMs must be installed in decreasing capacity with the largest DIMMs installed in the lowest numbered slots.

NOTE: Each hard partition (nPar) requires at least one (1) quad of memory DIMMs

HP Hard Drives

NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

SAS Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives

HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	619291-B21
HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581286-B21
HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581284-B21
HP 300GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	627117-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507127-B21
HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512547-B21

NOTE: Though the disks are 6Gb, implementation of the embedded HP Smart Array p410c SAS RAID controller limits performance of disks to 3Gb

NOTE: Please see the QuickSpecs for Technical Specifications and additional information related to HDDs:

http://h18000.www1.hp.com/products/quickspecs/12244_div/12244_div.html
(Worldwide)

6G SAS Hot Plug Enterprise Performance Solid State Drives

HP 200GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632492-B21
HP 400GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632494-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information related to HDDs:

http://h18000.www1.hp.com/products/quickspecs/14038_div/14038_div.html
(Worldwide)

Additional Options

HP Integrity Upgrade Kits	HP BL8x0c i4 Upgrade Blade	AM394A
	NOTE: At least one (1) processor must be purchased with each upgrade blade; other components may also be ordered. All processors in the upgraded server blade must be of the same type.	
	HP BL8x0c i4 Upgrade BL2 Blade Link	AM395A
	NOTE: Required for BL870c i4 server blade used in odd slot of c7000 or c3000.	
	HP BL8x0c i4 Upgrade BL2-c7E Blade Link	AM396A
	NOTE: Required for BL870c i4 server blade used in even slot of c7000.	
	HP BL8x0c i4 Upgrade BL2-c3E Blade Link	AM397A
	NOTE: Required for BL870c i4 server blade used in even slot of c3000.	
	HP BL8x0c i4 Upgrade BL4 Blade Link	AM398A
	NOTE: Required for BL890c i4 server blade used in c7000.	
	HP BL8x0c i4 Upgrade BL4-c3 Blade Link	AM399A
	NOTE: Required for BL890c i4 server blade used in c3000.	
HP Smart Array Controller	HP Smart Array P711m 6G SAS Controller	513778-B21
	NOTE: The P711M will function as a SAS RAID controller when connected to MDS600 disk subsystem via the HP BLc 6Gb SAS Switch. In the RAID mode, HP-UX 11i v3 is supported.	
	NOTE: The P711m will function as a Pass-Thru when connected to the HP P2000G3 SAS Storage Array via the HP BLc 6Gb SAS Switch. In the Pass-Thru mode, HP-UX 11i v3 is supported.	
	For more details please see QuickSpec: http://h18004.www1.hp.com/products/quickspecs/14035_div/14035_div.html	
HP Infiniband Mezzanine Options	HP 4X QDR InfiniBand ConnectX-2 Dual Port Mezzanine HCA for c-Class BladeSystem	592519-B21
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/12586_div/12586_div.html	
HP Ethernet Interconnects	HP BLc Virtual Connect FlexFabric 10Gb/24-port Module Option	571956-B21
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/13652_div/13652_div.html	

Additional Options

HP USB Options

HP Integrity USB External DVD-RW drive

AT120A

NOTE: The HP Integrity USB External DVD-RW drive solution includes the External DVD drive (AT120A) with 9 inch USB cable, power adaptor, power cable and Y-connector and 7-foot USB extension cable.

NOTE: The USB Y-connector goes between the extension cable (SH046AA) and the 9-inch USB cable fixed with DVD drive.

NOTE: The Y-connector should NOT be placed between the server blade and the 7-foot Extension cable.

HP Care Pack Services

HP offers a range of support services and additional services. For a complete listing of services, see:

HP.com external site: <http://www.hp.com/services/bladessystemservices>

HP Critical Service

Hardware Only, Critical Service, 7-Day x 24 Hour, 1 Year

HA112A1

Hardware Only, Critical Service, 7-Day x 24 Hour, 3 Years

HA112A3

Installation Services

Integrity BL890c i4 Server Blade Hardware Installation

HA113A1

NOTE: For more information: <http://www.hp.com/services/bladessystemservices>.

Memory

DIMM installation guidelines:

- 1. All DIMMs must be DDR3 registered memory modules (R-DIMMs)
- 2. All four DIMM slots in a memory bank must be populated. For each CPU, the memory blanks are designated as follows: first bank consists of pairs A and B, second bank consists of pairs C and D and the third bank consists of pairs E and F.
- 3. Banks must be populated in sequential Alphabetic order, starting with bank A and B for CPU0, followed by banks A and B for CPU1, etc.
- 4. All four DIMMs in a memory bank must be identical. Install identical DIMMs in quads, starting with DIMM pairs A and B CPU0.
- 5. DIMMs must be installed in decreasing capacity with the largest DIMMs installed in the smallest numbered DIMM slot.

HP Integrity BL890c i4 Server Blade

Standard Memory

32 GB PC3L 10600 DDR3 1333MHz ECC DIMMs (8 x 4 GB DIMMs) or (4 x 8 GB DIMMs)
Memory Bus Bandwidth: 6.4GT/s

Standard Memory Plus Optional Memory

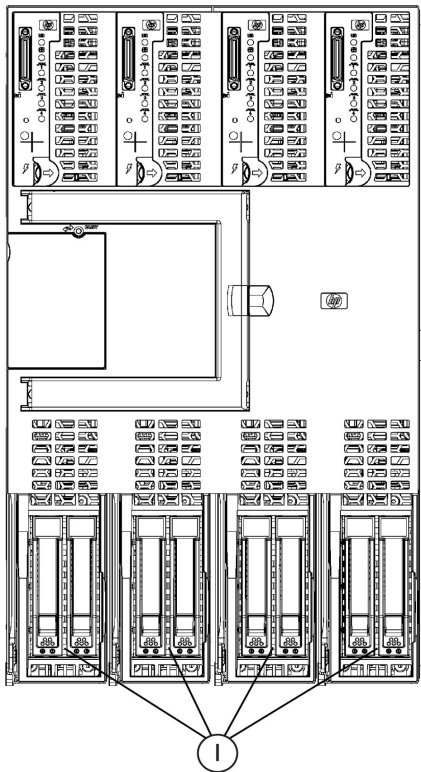
Up to 1.5 TB of DDR3 registered (R-DIMMs) memory is available.

Following are memory options available from HP:

HP Memory	HP BL8x0c i4 8GB (2x4GB) PCL3-10600 Registered CAS 9 Memory Kit	AM386A
	HP BL8x0c i4 16GB (2x8GB) PCL3-10600 Registered CAS 9 Memory Kit	AM387A
	HP BL8x0c i4 32GB (2x16GB) PCL3-10600 Registered CAS 9Memory Kit	AM388A
	The following memory options are also supported as field upgrades (no factory installation)	
	HP BL8x0c i2 8GB (2x4GB) PC3-10600 Registered CAS 9 Memory Kit	AM327A
	HP BL8x0c i2 16GB (2x8GB) PC3-10600 Registered CAS 9 Memory Kit	AM328A
	NOTE: Must be installed in quads. Therefore, memory kits must be ordered two (2) at a time, to reach quads (4 DIMMs) to be installed.	
	NOTE: DIMMs must be installed in decreasing capacity with the largest DIMMs in the smallest numbered slots.	
	NOTE: Each hard partition (nPar) requires at least one (1) quad of memory DIMMs	

Storage

- 1 8 x SFF SAS Hot Plug Hard Drives



Hard Drives

NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

SAS Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives

	Quantity Supported	Position Supported	Controller
900GB 6G 10K SFF	8	1-8	HP Smart Array p410i Controller
600GB 6G 10K SFF			
450GB 6G 10K SFF			
300GB 6G 10K SFF			
300GB 6G 15K SFF			
146GB 6G 15K SFF			

6G SAS Hot Plug Enterprise Performance Solid State Drives

	Quantity Supported	Position Supported	Controller
200GB 6G SAS SLC	8	1-8	HP Smart Array p410i Controller
400GB 6G SAS SLC			

Power Specifications

NOTE: The HP Power Advisor is a tool provided by Hewlett-Packard to assist in the estimation of power consumption and proper selection of components including power supplies at a system, rack, and multi-rack level. A variety of additional features are also provided including a condensed bill of materials, a cost of ownership calculator, and a power report. For additional information please visit: HP Power Advisor: <http://h18004.www1.hp.com/products/solutions/power/index.html>

Technical Specifications

System Unit	Dimensions	Height	14.42 in (36.63 cm)
		Depth	19.10 in (48.51 cm)
		Width	8.29 in (20.82 cm)
	Shipping Dimensions	Height	20.50 in (54.61 cm)
		Depth	26.00 in (66.04 cm)
		Width	15.94 in (40.49 cm)
	Weight	Maximum	106lbs. (48.08 kg)
	Temperature Range*	Operating	10° to 35° C (50° to 95° F)
		Non-Operating	-40° to 60° C (-40° to 140° F)
		Storage	-20° to 60° C (-4° to 140° F)
		Maximum Wet Bulb Temperature	30° C (86° F)
	Relative Humidity**	Operating	15% to 80%
		Shipping	10% to 90%
		Storage	10% to 90%

*All temperature ratings shown are for sea level. An altitude derating of 1°C per 304.8 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Upper operating limit is 3,048m (10,000 ft) or 70 Kpa/10.1 psia. Upper non-operating limit is 9,144 m (30,000 ft) or 30.3 KPa/4.4 psia.

**Storage maximum humidity of 90% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

SAS RAID HP p410e Controller	Disk Drive and Enclosure Interface	3Gb SAS (Serial Attached SCSI)
	SAS Connectors	8 internal (SFF8484) x4 wide port connector
	Cache Memory Speed	DDR2-800 memory provides up to 4.2 GB/s maximum bandwidth
	Server Interface	X1 5.0Gbps PCIe provides 1GB/s maximum bandwidth
	SAS Speed	Eight x 1 3G SAS provides 2400MB/s maximum bandwidth
	Cache Memory	Four (4) integrated SAS read only 512MB cache, one per HP Smart Array p410i SAS controller
	Logical Drives Supported	Up to 32 logical volumes
	Maximum Logical Drive Capacity	Up to 64 logical
	Host Memory Addressing	64-bit, supporting greater than 4GB server memory space
	RAID Support	RAID 0 (striping) and 1 (Mirroring), and RAID 0+1 (mirrored and striped) (not supported with BL8x0c i4 blades)
Upgradeable Firmware		Upgradeable Firmware with Recovery ROM features Online Drive Flash requires 256MB, 512MB, or 1GB cache module

Technical Specifications

Embedded Dual NC553i 10Gb 2-port FlexFabric NICs with Flex-10 support	Network Interface	10000Base-Sx
	Compatibility	IEEE 802.3ib QoS 802.3x flow control, and 802.3ap 10GBase-KR
	Data Transfer Method	PCI Express, four lanes (x4)
	Network Transfer Rate (Theoretical Maximum Values)	1 Dual 10Gb ports offer up to 40Gb/s bidirectional theoretical throughput

Environment-friendly Products and Approach	End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green . To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
		The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green . These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Regulatory Compliance	Regulatory Model Number	RSVLA-BC11
	Electromagnetic Interference	Complies with FCC Rules and Regulations, Part 15, as a Class A digital device. Manufacturer's Declaration to EN55022 Class A, VCCI Registered, Class A, KC (Korea Certification), BMSI Taiwan, CSA Certified, compliant with IEC 60950, UL 60950, EN 60950 and EN41003
	Safety	UL Listed, CSA Certified, TUV GS Mark compliant with EN 60950 and EN 41003
	More detailed regulatory documents and certifications	http://docs.hp.com/en/hw.html

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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.