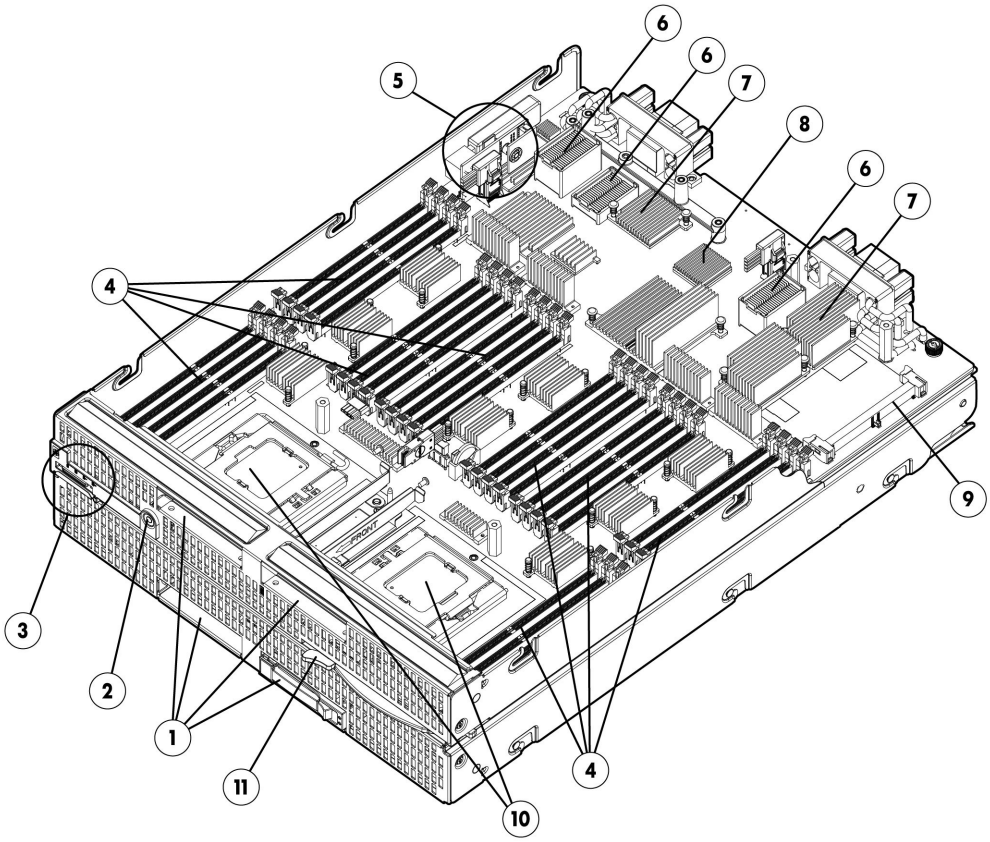
Overview



HP ProLiant BL680c Generation 7 (G7) Server Blade

Front view image showing side "A"

1. Four hot-plug SAS/SATA/SSD drive bays
2. Power on/standby button
3. UID, health, and network adapter LEDs
4. 64 RDIMM slots supporting up to 2.0TB of DDR3-1333MHz memory (operating up to 1066 MHz) (32 RDIMMs per side)
5. One USB 2.0 port, one MicroSD high capacity (SDHC) port, and one TPM 1.2 connector
6. Seven PCIe Gen2 I/O expansion mezzanine slots (3 on one side, 4 on the other)
7. Six NC553i 10Gb FlexFabric adapter ports (4 one on side, 2 on the other)
8. iLO 3 Management adapter port
9. HP P410i Smart Array flash cache connector
10. Two, three or four Intel® Xeon® 4800 family processors (below the hard drives) (two per side)
11. Server release lever

At A Glance

This document covers the HP ProLiant BL680c G7 server blade only. For more information on the HP BladeSystem c-Class Enclosure and HP BladeSystem c-Class Interconnect and Mezzanine components, please see the following:

HP BladeSystem c3000 Enclosure QuickSpecs:

Overview

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

HP BladeSystem c7000 Enclosure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.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 ProLiant BL680c G7 Server Blade provides maximum performance and unparalleled scale-up expansion never before seen in a four-processor x86 server blade. The ProLiant BL680c G7 supports the Intel® Xeon® E7-4800 family and E7-8867L processors. Fully utilizing the design architecture of the Intel® Xeon® 7500 chipset, up to four top performing 130W processors are supported along with 64 RDIMM slots creating the first blade server to offer 2.0TB of memory. The six 10Gb FlexFabric ports with built-in FCoE, Flex-10, hardware-based accelerated iSCSI, iSCSI boot, TCP/IP offload engine, and autosensing 10GbE and 1GbE combined with the seven (7) PCIe Gen2 mezzanine expansion slots. The extensive expandability and performance of the BL680c G7 creates an extremely powerful database engine while handling a variety of very demanding workloads and making traditional multi-processor (MP) rack to blade transition a true reality.

Traditional MP server blades are typically unbalanced providing processor performance and density at the expense of proportional memory capacity and I/O bandwidth. As such, these unbalanced servers fail when faced with larger databases higher-density virtualization applications. Today, you have a better alternative. By designing a balanced architecture, the BL680c G7 is a very progressive 4P blade offering that ensures that all subsystems can be used effectively under a broad range of enterprise applications and workloads. The 4P BL680c G7 along with the 2P BL620c G7 together provide a complete Intel® Xeon® portfolio creating a new class of scale-up HP ProLiant server blades delivering the reliability and performance you need to handle demanding workloads with confidence.

- **Processor**:
  - Two, three, or four Intel® Xeon® E7-4800/8867L series processors each up to 10 cores and 130 watts
    NOTE: One processor is not supported.
    NOTE: All processors within the server must be identical.
  - Extensive list of 40 key system-wide availability features
  - Advanced Core Disable feature allowing more control over enabling/disabling processor cores
  - Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI) delivering robust encryption without the need for additional appliances or increased performance overhead for improved encryption performance and efficiency
  - Intel® 7500 chipset with two integrated memory controllers per processor for maximum system performance
  - Low power Intel 7510 Scalable Memory Buffer
  - Intel Intelligent Power Technology including:
    - Lower partial active power that automatically pleases processor, memory, and I/O controller into the lowest available power states to meet the current workload while minimizing performance impact
    - Lower idle power that allows idling cores to be reduced to near-zero power independent of other cores, reducing server idle power consumption
  - Meshed network of ten Intel® QuickPath Interconnects (Intel® QPI) each up to 6.4GT/s (25.6GB/s data bandwidth) for point-to-point high speed links increasing bandwidth and lowering latency
  - Intel® Hyper-threading resulting in higher processing throughput and improved multi-threaded application performance
  - Intel® Turbo Boost Technology that can automatically operate the processor(s) at a faster frequency than the base operating frequency under certain circumstances.
  - Up to 30MB of L3 cache per processors increasing efficiency of cache-to-cache data transfers maximizing memory bandwidth while reducing latency through storing greater amount of data thus reducing data transfers to memory.
  - Intel® Virtualization Technology that assist virtualization software in generating more efficient virtualization solutions.
  - PCI Gen2 increasing bandwidth up to 4 GB/s on each x8 PCI Express Gen2 connection.
- **Memory**:

Overview

- 2.0TB memory capacity via sixty-four (64) DDR3 registered DIMMs (RDIMM) slots operating up to 1066MHz
  NOTE: The DDR3 memory speed is a function of the processor Intel® QPI speed. See the "Memory" section below for details.
- 8GB, 16GB and 32GB 1.35V DDR3L RDIMM low power memory options providing up to a 0.15V power savings per each DIMM compared to standard 1.5V DDR3 RDIMMs
- For maximum memory bandwidth, performance, and capacity, two integrated memory controllers per each processor that connect to a total of four Intel® Scalable Memory Buffers (SMB)
- Memory availability features including:
  - Data bus ECC protection and advanced ECC / SDDC
  - Double Device Data Correction (DDDC)
  - HP Memory Quarantine (based on Intel MCA Recovery technology)
  - Demand and patrol scrubbing
  - DIMM address/control bus parity protection
  - Memory mirroring and memory failover
  - Rank sparring (online spare)
  - Intel® Scalable Memory Interface (SMI) lane and clock failover
  - Intel® SMI packet retry
  - Failed DIMM isolation

- **Storage Controller**:
  - Integrated SAS version 2.0 (6Gb) HP Smart Array P410i Controller with RAID 0, 1 and 1+0.
    NOTE: The P410i is configured with no cache allowing the end user to select the desired cache option (if cache is desired in the first place). This provides RAID 0, 1 and 1+0 in the standard configuration. However, options are available to add RAID 5 and 6.
    NOTE: RAID 0, 1, and 1+0 are supported on the P410i without the need for a cache option.
  - P410i 512MB and 1GB flash backed write cache (FBWC) and Smart Array Advanced Pack (SAAP) options. NOTE: RAID 5 is supported on the P410i with the addition of any FBWC option.
    NOTE: RAID 6 support on the P410i may be added with addition of any FBWC option and the Smart Array Advanced Pack (SAAP) option.
  - Optional Smart Array RAID mezzanine controllers (with BBWC and FBWC) for connection to external storage.
  - Four (4) slots for battery cache options.
  - Optional IO Accelerator cards for high performance I/O.
- **Internal Drive Support**:
  - Four (4) hot-plug small form factor (SFF) drive bays
  - Support for SAS, SATA, and SSD hot-plug hard drives
    NOTE: SAS, SATA, and/or SSD drives cannot be mixed within the server.
- **Network Controller**:
  - Six (6) embedded HP NC553i 10Gb FlexFabric adapter ports supporting autosensing 10Gb/1Gb Ethernet, FCoE, Flex-10, TCP/IP offload engine, hardware-based accelerated iSCSI, and iSCSI boot
    NOTE: A maximum of six dual-port 10Gb Ethernet mezzanine cards may be added for a total of eighteen 10Gb Ethernet ports (six embedded plus twelve optional). When installing more than four dual-port 10Gb Ethernet mezzanine cards, an overall Ethernet performance trade-off may be experienced depending on system configuration, application, and optimization.
    NOTE: VMware VSpherev4 supports a maximum of four 10GbE network ports on any server. Therefore, in a VMware VSphere v4 environment, two BL680c G7 embedded network adapter ports must be disabled via the server BIOS. VMware VSphere v5 supports up to eight 10GbE network ports. See http://www.vmware.com for more information.
    NOTE: Fibre Channel over Ethernet (FCoE) capability requires the use of an HP Virtual Connect FlexFabric 10GB/24-port Module or HP 10GbE Pass-Thru Module.
    - The embedded adapter ports are routed interconnect bays 1 and 2 (c7000) and interconnect bay 1 (c3000)
  - One Ethernet-specific mezzanine slot supporting a dual-port mezzanine card [routed interconnect bays 1 and 2 (c7000) and interconnect bay 1 (c3000)] for a total of eight (8) "embedded" Ethernet adapters

Overview

NOTE: The Ethernet-specific mezzanine slot allows the customer to decide if the additional 7th and 8th "embedded" Ethernet ports are desired and allows them to choose between dual-port 10Gb FlexFabric, 10GbFlex-10, 10GbE, or 1GbE per the Ethernet mezzanine adapters listed in the "Additional Options" section.
NOTE: A maximum of six dual-port 10Gb Ethernet mezzanine cards may be added for a total of eighteen 10Gb Ethernet ports (6 embedded plus 12 optional).
NOTE: When installing more than four dual-port 10Gb Ethernet mezzanine cards, an overall Ethernet performance trade-off may be experienced depending on system configuration, application, and optimization.

- One (1) 10/100 network adapter port dedicated to iLO 3 Management

- **Mezzanine Support**:
  - Seven (7) mezzanine expansion slots as follows:
    - Four (4) Type II (25 watts) x8 PCIe Gen2, mezzanine slots 2, 3, 4, 7 supporting QDR IB, 4Gb and 8Gb FC, 10Gb FlexFabric, 10Gb Flex10, 10GbE, 1GbE, I/O accelerator cards, and the Smart Array RAID controllers.
      - Mezzanine slots' 2 and 7 ports are routed to interconnect bays 5,6,7,8 (c7000) and 3,4,3,4 (c3000)
      - Mezzanine slots' 3 and 4 ports are routed to interconnect bays 7,8,5,6 (c7000) and 3,4,3,4 (c3000)
    - Two (2) Type I (15 watts) x4 PCIe Gen2, mezzanine slots 1 and 5 supporting 4Gb and 8Gb FC,10Gb FlexFabric, 10Gb Flex10, 10GbE , 1GbE, and the I/O accelerator cards
      - Mezzanine slots' 1 and 5 ports are routed to interconnect bays 3, 4, 3, 4 (c7000) and 2,2,2,2 (c3000)
    - **NOTE:** HP recommends 10Gb adapters be installed in a x8 PCIe slot for optimal performance.
    - One (1) Type I (15 watts) x8 PCI Gen 2 dual-port Ethernet-specific slot (mezzanine slot 6); see above "Network Controller" section for more information
      - Mezzanine slot's 6 ports are routed to interconnect bays 1, 2 (c7000) and 1, 1 (c3000)
    - **NOTE:** Type II slots accept both Type I or Type II cards. Type I slots accepted Type I cards only.
- **Internal USB and SD Support**:
  - One (1) internal USB 2.0 connector for USB flash media drive keys
  - One (1) internal micro secure digital high capacity (SDHC) card slot
- **Trusted Platform Module** (TPM):
  - One (1) internal TPM 1.2 module connector
- **Infrastructure Management**:
  - This server blade requires the latest version of the Onboard Administrator firmware. This firmware release may also require other subsystem firmware upgrades. For information on the latest firmware versions, please see the Blades Firmware Maintenance website at: http://h18004.www1.hp.com/products/blades/components/c-class-compmatrix.html
  - HP Integrated Lights-Out 3 (iLO 3) management processor for simplified server setup, health monitoring and recovery, power and thermal control, and lights-out remote administration.
  - HP Insight Control, a product option, delivers essential infrastructure management that can help save time and money by making it easy to deploy, monitor, control and optimize your IT infrastructure through a single, simple management console. Insight Control supports both Windows-based central management servers.
  - HP Matrix Operating Environment for ProLiant, a product option, is an integrated command center that enables IT Staff personnel to continuously analyze and optimize a converged infrastructure, while automating and reducing the cost of common data center tasks by as much as 40 percent. This ultimately enables them to dynamically keep pace with the organization's changing business requirements.
- **Operating System Support**:
  - Microsoft Windows, RHEL, SLES, Oracle Solaris, VMware, and Citrix XenServer
- **Form Factor**:
  - Full height, double wide server blade that plugs into the HP BladeSystem c3000 and c7000 enclosures
- **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 4 HP ProLiant BL680c G7 servers plugged vertically.
    - The HP BladeSystem c3000 rack enclosure is 6U high and holds up to 2 HP ProLiant BL680c G7 servers plugged horizontally.

Overview

- 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**:
  - This product is covered by a global limited warranty and supported by HP Services and a worldwide network of HP Authorized Channel Partners resellers. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through HP Care Pack services or customized service agreements. Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.
    NOTE: Server warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have HP replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at:
    http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html

Standard Features

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

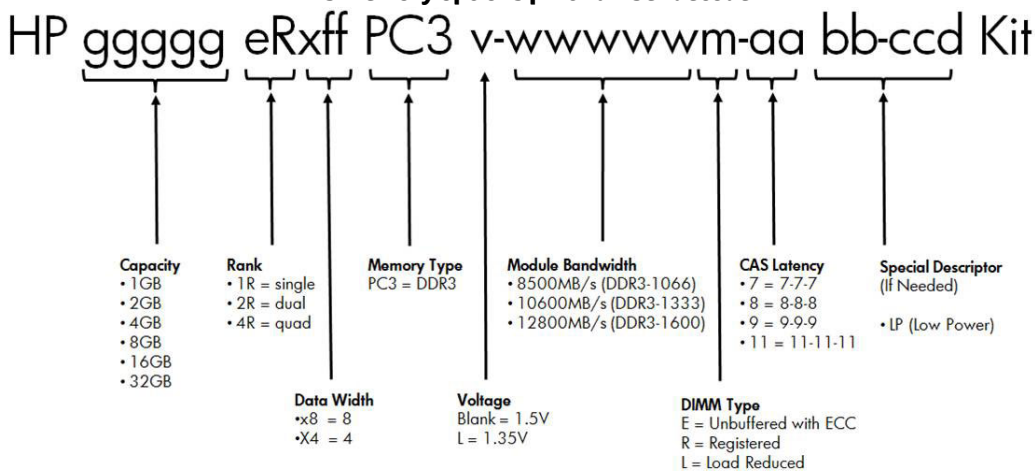
Processors One or more of the following depending on model	**Ten-Core Processors** Intel® Xeon® E7-4870 (2.40GHz/10-core/30MB, 6.40GT/s QPI, 130W) Processor **NOTE:** Offered as Configure-To-Order. See the Factory Integrated Models section for more details. Intel® Xeon® E7-4860 (2.26GHz/10-core/24MB, 6.40GT/s QPI, 130W) Processor Intel® Xeon® E7-4850 (2.00GHz/10-core/24MB, 6.40GT/s QPI, 130W) Processor Intel® Xeon® E7-8867L (2.13GHz/10-core/30MB, 6.40GT/s QPI, 105W) Processor **NOTE:** Offered as Configure-To-Order. See the Factory Integrated Models section for more details. **Eight-Core Processors** Intel® Xeon® E7-4830 (2.13GHz/8-core/24MB, 6.40GT/s QPI, 105W) Processor Intel® Xeon® E7-4820 (2.0GHz/8-core/18MB, 5.86GT/s QPI, 105W) Processor **NOTE:** Offered as Configure-To-Order. See the Factory Integrated Models section for more details. **Six-Core Processors** Intel® Xeon® E7-4807 (1.86GHz/6-core/18MB, 4.80GT/s QPI, 95W) Processor **NOTE:** Offered as Configure-To-Order. See the Factory Integrated Models section for more details. **NOTE:** All processors within the server must be identical. **NOTE:** The server supports two, three, or four processors. One processor is not supported. **NOTE:** The minimum processor configuration is two processors that must be installed in socket CPU1 and CPU3. **NOTE:** If upgrading an existing BL680c G7 server to a different processor, the server's ROM must be flashed to the latest BIOS prior to the upgrade. **NOTE:** All processors support Intel® Hyper-threading. **NOTE:** All processors support Intel® Turbo Boost Technology except the E7-4807.
Upgradeability	Upgradeable to three and four processors **NOTE:** All processors within the server must be identical. **NOTE:** All servers support two, thee, or four processors. One processor is not supported. **NOTE:** The minimum processor configuration is two processors that must be installed in socket CPU1 and CPU3. **NOTE:** If upgrading an existing BL680c G7 server to a different processor, the server's ROM must be flashed to the latest BIOS prior to the upgrade.
Cache Memory	Up to 30MB level 3 cache memory
Chipset	Intel® 7500 chipset

Standard Features

Memory

Type	DDR3-1333 and DDR3-1066 Registered (RDIMM) (operating up to 1066 MHz)
Standard	64GB (8 x 8GB)
Maximum	2.0TB (64 x 32GB RDIMMs)

DDR3 memory options part number decoder



NOTE: See the "Memory" section for memory guidelines, installation rules, and additional general information.

Network Controllers

Six (6) embedded HP NC553i 10Gb FlexFabric adapter ports supporting autosensing 10Gb/1Gb Ethernet, FCoE, Flex-10, TCP/IP offload engine, hardware-based accelerated iSCSI, and iSCSI boot

One Ethernet-specific slot (mezzanine slot 6) supporting a dual-port mezzanine card for a total of eight (8) "embedded" Ethernet adapter ports

NOTE: Fibre Channel over Ethernet (FCoE) capability requires the use of an HP Virtual Connect FlexFabric 10Gb/24-port Module or HP 10GbE Pass-Thru Module.

NOTE: The Flex-10 capability requires the use of an HP Virtual Connect Flex-10 10Gb Ethernet module or HP 10GbE Pass-Thru Module.

One (1) 10/100 network adapter port dedicated to iLO 3 Management

---

I/O Expansion Slots

Seven (7) mezzanine expansion slots as follows:

- Four (4) Type II (25 watts) x8 PCIe Gen2
- Two (2) Type I (15 watts) x4 PCIe Gen2
- One (1) Type I (15 watts) x8 PCI Gen 2 dual-port Ethernet-specific mezzanine slot

NOTE: Type II slots accept both Type I or Type II cards. Type I slots accepted Type I cards only.

Integrated Manageability HP Integrated Lights-Out 3 (iLO 3)

Standard Features

Storage Controller	Integrated SAS version 2.0 (6Gb) HP Smart Array P410i Controller with RAID 0, 1 and 1+0. **NOTE:** The P410i is configured with no cache allowing the end user to select the desired cache option (if cache is desired in the first place). This provides RAID 0, 1 and 1+0 in the standard configuration. However, options are available to add RAID 5 and 6. **NOTE:** RAID 0, 1, and 1+0 are supported on the P410i without the need for a cache option. P410i 512MB and 1GB flash backed write cache (FBWC) and Smart Array Advanced Pack (SAAP) options. **NOTE:** RAID 5 is supported on the P410i with the addition of any FBWC option. **NOTE:** RAID 6 support on the P410i may be added with addition of any FBWC option and the Smart Array Advanced Pack (SAAP) option. Optional Smart Array RAID mezzanine controllers (with BBWC and FBWC) for connection to external storage **NOTE:** The server supports up to a combined total of four (4) battery cache options for the P410i and/or optional Smart Array RAID controllers. Optional IO Accelerator cards for high performance I/O		
Maximum Internal Storage One or more of the following depending on model	Hot-plug SAS	4.0TB	4 x 1.0TB drives
	Hot-plug SATA	4.0TB	4 x 1.0TB drives
	Hot-plug SAS SSD	3.2TB	4 x 800GB drives
	Hot-plug SATA SSD	1.6TB	4 x 400GB drives
	NOTE: SAS, SATA, and/or SSD drives cannot be mixed within the server.		
Graphics	Integrated ATI RN-50 1280 x 1024 x 16M color		
	Resolution Color 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	
Fibre Channel	Up to six (6) optional 4Gb and/or 8Gb Fibre Channel HBA mezzanine adapters (Brocade, Emulex and QLogic options)		
Compatible SAN	HP ProLiant BL680c G7 server blades are optimized for HP MSA, EVA, and XPHP and are compatible with select third party SANs. Se blade storage page for more details at: http://h18004.www1.hp.com/products/blades/components/c-class-sans.html.		
HP Insight management software	HP Service Pack for ProLiant	HP Service Pack for ProLiant (SPP) and HP Smart Update Manager (HP SUM) version 5 provide a new, comprehensive approach to firmware and system software maintenance. Together they provide better operating stability and ensure maximum uptime. The SPP will be updated at a predictable cadence, typically coinciding with new HP server hardware launches. By enabling firmware to be updated online and integrating firmware and system software updates in one operation HP SUM and the SPP offer faster updates of individual servers and dramatically faster updates of entire BladeSystem enclosures. Further improving system uptime and stability is the fact that HP provides 12 months of support on each Service Pack for ProLiant.	

The user experience around HP SUM and the SPP has been improved in several ways, starting with the web download. A single web page provides access to a single download containing both the latest version of HP SUM version 5 and the latest SPP. Optional smaller subsets with only specific types of servers or specific operating systems are offered to save on download time. The HP SUM application has been re-written to provide a more straightforward, intuitive user interface that guides the user through the steps of discovery, analyses and update, providing comprehensive information on available updates, criticality and interdependencies. This information is also available in reports. By providing the option of multiple local or shared repositories which can be easily updated from hp.com, HP SUM provides the tools to optimize stability and consistency throughout the company. While HP SUM and the SPP will recommend the combinations of firmware and system software that HP has found to be the best practice, the application gives customers the flexibility to set their own specific baseline.

The Service Pack for ProLiant has been rigorously tested with specific attention for interaction between firmware, drivers and agents both within the server as well as in interaction with the BladeSystem enclosure components (Onboard Administrator and Virtual Connect). This testing ensures the highest quality as well as providing the input for HP SUM to deploy updates taking into account all interdepencies, when determining the correct updates and order of update deployment.

The Service Pack for ProLiant (which includes HP SUM 5) can be downloaded from www.hp.com/go/spp/download. More information can be found: www.hp.com/go/spp and http://www.hp.com/go/hpsum

HP Insight Foundation

Insight Foundation is being baselined at version v8.70 which means the following:

- Its Media Kit (contains 2 SmartStart CDs, the Firmware DVD, and the Management DVD) will continue to ship with all supported ProLiant G7 or earlier BTO servers until the last supported server is no longer shipping.
- The Media Kit will not be updated past version 8.70.
- ProLiant G7 or earlier CTO servers are able to order the Media Kit with the understanding that the media is not updated. Please check specific server QuickSpecs for availability of CTO Kit.
- PSP and Firmware DVD downloads will be updated through 2Q 2012 at the HP Insight Foundation Suite for ProLiant downloads tab: http://www.hp.com/go/foundation.

Customers are urged to use the replacement product, HP Service Pack for ProLiant, instead of Insight Foundation Suite which is found at these location:

- www.hp.com/go/spp
- www.hp.com/go/spp/download

HP Integrated Lights-Out (iLO)

HP Integrated Lights-Out (iLO) simplifies server setup, health monitoring, power and thermal control, and lights-out remote administration of ProLiant ML, DL, and BL servers. HP iLO functions without additional software and can

Standard Features

		be accessed from any location via a web browser. HP iLO works hand-in-hand with HP Systems Insight Manager, Insight Control, and Matrix Operating Environment for ProLiant, helping customers unleash the value of the ProLiant platform and deliver the highest possible quality of IT service. For more information, visit: www.hp.com/go/iLO.
	HP Insight Control	HP Insight Control, a product option, delivers essential infrastructure management that can help save time and money by making it easy to deploy, monitor, remote control, and optimize your IT infrastructure through a single, simple management console. Two versions of Insight Control are available, to serve environments requiring either a Linux-based or a Windows-based central management server: HP Insight Control for Linux, and HP Insight Control. See www.hp.com/go/insightcontrol. HP Insight Control includes one year of 24 x 7 HP Software Technical Support and Update Service ensuring rapid access to HP support staff and proactive delivery of software updates. For more information about this service, please visit: http://www.hp.com/services/insight.
	HP Matrix Operating Environment	The HP Matrix Operating Environment (Matrix OE) for ProLiant and Integrity servers is an integrated command center that helps you instantly adjust to dynamic business demands. This advanced infrastructure management software lets you reduce the cost of common data center tasks by up to 40 percent while keeping pace with your changing business. The HP Matrix OE includes the automated provisioning, optimization, and recovery management capabilities for HP CloudSystem Matrix, the ideal platform for private cloud and Infrastructure as a Service (IaaS). **NOTE:** For more information, visit: http://www.hp.com/go/matrixoe.
High Performance Clusters	HP Cluster Platforms	HP Cluster Platforms are specifically engineered, factory-integrated large-scale ProLiant clusters optimized for High Performance Computing, with a choice of servers, networks and software. Operating system options include specially priced offerings for Red Hat Enterprise Linux and SUSE Linux Enterprise Server, as well as Microsoft Windows HPC Server. A Cluster Platform Configurator simplifies ordering. http://www.hp.com/go/clusters
	HPC Interconnects	High Performance Computing (HPC) interconnect technologies are available for this server as part of the HP Cluster Platform portfolio. These high-speed InfiniBand and Gigabit interconnects are fully supported by HP when integrated within an HP cluster. Flexible, validated solutions can be defined with the help of configuration tools. http://www.hp.com/techservers/clusters/ucp/index.html
	HP Insight Cluster Management Utility	HP Insight Cluster Management Utility (CMU) is an HP-licensed and HP-supported suite of tools that are used for lifecycle management of hyperscale clusters of Linux ProLiant systems. CMU includes software for the centralized provisioning, management and monitoring of nodes. CMU makes the administration of clusters user friendly, efficient, and effective. http://www.hp.com/go/cmu

Standard Features

HP HPC Linux Value Pack	HP HPC Linux Value Pack (Value Pack) is an HP-licensed and HP-supported option to HP Insight CMU, for the development and deployment of applications on HPC Cluster Platforms. Value Pack includes the Platform LSF workload scheduler and Platform Application Center, as well as the HP-MPI parallelization library. HP HPC Linux Value Pack

Operating Systems and Virtualization Software Support for ProLiant Servers

Microsoft Windows Server
Red Hat Enterprise Linux (RHEL)
SUSE Linux Enterprise Server (SLES)
Oracle Solaris
VMware Server
Citrix XenServer

NOTE: For more information on HP's Certified and Supported ProLiant Servers for OS and Virtualization Software and latest listing of software drivers available for your server, including how to purchase from HP, please visit our OS Support Site at: http://www.hp.com/go/ossupport

Availability

Memory

- HP Memory Quarantine (based on Intel MCA Recovery technology). In conjunction with the operating system support, allows a server to recover from uncorrectable memory errors which would have otherwise caused a system crash.
- Double Device Data Correction (DDDC). DDDC provides the ability to save a DIMM from being replaced due to a bad dram device.
- Data Bus ECC protection for automatic correction from a single data bit error and detection of double data error bits.
- Advanced ECC / SDDC provides continued memory operation in the event of a single memory device failure and allows removal of a single DRAM from the memory map if it exhibits a failure and recovers its data into a new device.
  - Supports for both x4 and x8 Intel® SDDC.
- Demand Scrubbing writes corrected data back to the memory once a correctable error is detected on a read transaction.
- DIMM Address/Control Bus Parity Protection provides a means to detect and protect command and address errors.
- Memory Failover uses a mirrored DIMM once a failed DIMM in a mirrored set is detected.
- Memory Mirroring provides a copy of memory stored with dynamic failover in case of failure within socket (intra-socket) memory mirroring.
  - The system will operate in non-hemisphere mode when mirroring is enabled.
- Rank Sparring (On Line Spare) provides dynamic failover to a spare DIMM rank or spare rank pair behind the same memory controller. Cannot be enabled concurrently with memory mirroring.
  NOTE: HP offers the rank sparing rather than DIMM sparing as rank sparing uses less spare memory resulting in less overhead.
- Failed DIMM Isolation identifies a specific failing DIMM lockstep pair thereby enabling the user to replace only the failed DIMM pair. Identifies a single DIMM for correctable errors and DIMM pair for uncorrectable errors.

Virtualization

- Intel® VT-x (FlexMigration, FlexPriority, and Extended Page Tables) provides:

  - Platform control between the VMM and guest OSs for faster, more reliable and secure transfers.
  - VM migration features that enhance flexibility for failover, load balancing, disaster recovery, and maintenance.
- Intel® VT-x Real Mode & Pause Loop Exiting:
  - Real Mode allows guests to operate in real mode, removing the performance overhead and complexity of an emulator.
  - Pause Loop Exiting provides detection of spin locks in guest software and helps avoid lock-holder preemption to reduce overhead and improve performance
- Intel® VT-d (Intel® Virtualization Technology for Directed I/O) enables the VMM to assign specific I/O devices to specific guest OSs improving security and availability.

Mezzanine options and I/O

- Optional dual-port Fibre Channel mezzanine cards for redundant SAN connections.
- Optional dual-port InfiniBand mezzanine cards for redundant high performance connections.
- Six embedded Ethernet adapter ports for redundant LAN connections.
- Multiple mezzanine I/O expansion slots each supported multiple data paths routed to redundant interconnect modules.
- Network Adapter Teaming (Bonding) provides network fault tolerance, transmit load balancing, and switch-assisted load balancing.

Processor/Chipset

- Processor Internal Sensors & Thermal Control protection against over-temperature conditions.
- Cache parity/ECC protects cache data from accidental data corruption due to particle hits.
- Machine Check Architecture (MCA) detects and captures hardware errors such as system bus, ECC, parity, cache, other.
- Enhanced MCA handling & error logging builds upon the original Machine Check Architecture to: offers more "banks" and increased "resolution" for reporting errors that cause MCA events and 2) sets check flags for the OS to poll.
- External Bus Error Recovery (ECC) enables automatic correction from a single data bit error and detection of double data error bits on the memory data bus.
- Corrupt Data Containment tags faulty data before it is consumed (often called data poisoning) to limit the impact to the currently running program and to greatly reduce the need to reset the system.
- On-Die Error Protection protects registers from particle hits.

Storage

- Four hot-plug SAS/SATA/SSD drive bays.
- Integrated HP Smart Array P410i Controller with RAID 0 and 1 standard; optional RAID 1+0, 5, and 6.
- Integrated HP Smart Array P410i Controller upgradeable firmware with recovery ROM capability.
- HP Smart Array P410i flash backed write cache (FBWC) options to 1GB.
- Optional multiple Smart Array RAID mezzanine controllers (with BBWC and FBWC) for direct attach and shared SAS storage external to the c-Class enclosure.

Intel® QuickPath Interconnect (QPI)

- QPI Link Retry restarts as cycle when a failure is detected on the link.
- QPI Clock Failover redirects the forwarded clock to one of the two failover clock lanes in the event of a forwarded clock failure.

Standard Features

- QPI Self-Healing enables a QPI link to map a failed lane and downshift from full to ½ width (or ½ width to ¼ width) QPI link if there are errors on the link.
- QPI Cycle Redundancy Checking (CRC) automatically detects data errors using a checksum of either 8 bits or 16 bits.
- QPI Poisoning tags an erroneous packet with a "poisoned bit" on the QPI fabric.
- QPI Lane Failover identifies a faulty lane within data paths removing them from operation reducing command/address errors.

Server Blade Enclosure Infrastructure

- Up to 10 hot-plug redundant Active Cool fans per enclosure.
- Up to 6 hot-plug high efficiency redundant power supplies per enclosure.
- Dual grid power providing redundant rack enclosure power feeds to the enclosure.
- Up to eight interconnect modules per enclosure providing four simultaneous redundant fabrics for FlexFabric, Virtual Connect Ethernet, Fibre Channel, InfiniBand, iSCSI, SAS, etc.
- Optional enclosure redundant Onboard Administrator system management module.

Industry Standard Compliance

- ACPI 2.0 Compliant
- PCI 2.2 Compliant
- Microsoft® Logo certifications
- USB 2.0
- Secure Digital 2.0
- TMP 1.2
- IEEE (see the NC553i Technical Specifications section)
- Advanced Encryption Standard (AES)
- Triple Data Encryption Standard (3DES)
- SNMP
- SSL 2.0
- Active Directory v1.0 (Windows 2003)
- IPMI 2.0
- DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP)

Security

- Intel® AES-NI
- Power-on password
- Administrator's password
- Integrated Lights-Out 3 with:
  - 12 customizable user accounts
  - SSL encryption
  - Secure Shell version 2
  - Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser, CLP and XML scripting interface
  - AES and RC4 encryption of video
  - Disable via a global setting
- Keyboard password
- External USB port enable/disable
- Network server mode
- Serial interface control
- TPM (Trusted Platform Module) 1.2 option

Standard Features

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 ProLiant Server Blades, HP BladeSystem, HP 9000 servers as well as the MSAxxxx, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches. For more information on Factory Express services on 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

Service and Support

HP Technology Services for Industry Standard Servers and BladeSystem
Capitalizing on HP ProLiant server and HP BladeSystem capabilities requires a service partner who understands your increasingly complex business technology environment. That's why it makes sense to team up with the people who know HP infrastructure hardware and software best - the experienced professionals at HP Services.

Protect your business beyond warranty with HP Care Pack Services
HP Care Pack services offer complete care and support expertise with committed response choices designed to meet your IT and business needs.

HP Foundation Care services offer scalable reactive support-packages for HP industry-standard servers and software. You can choose the type and level of service that is most suitable for your IT and business needs. HP Proactive Care delivers high levels of system availability through proactive service management and advanced technical response.

Recommended HP Care Pack Services for your HP product

Optimized Care

3-Year HP 6 hour Call to Repair Response, Proactive Care
Combined reactive and proactive support for hardware and software helping optimize your systems and delivering high levels of availability through proactive service management and advanced technical response. Hardware problem resolution to return the hardware in operating condition within 6 hours of the initial service request. A Technical Account Manager, as your single point of contact, will own your call or issue end to end until resolved.
http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf

HP Install c-Class Server Blade Service
This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware is installed smoothly, efficiently, and with minimal disruption of your IT and business operations.

Standard Care

3-Year HP 24x7 4 hour response, Proactive Care Service
This service gives you combined reactive and proactive support including rapid access to our Advanced Solution Center to manage and prevent problems and a Technical Support Specialist with a broad level of technical knowledge that will engage with additional technical expertise as needed from HP's vast global resources.
http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf

HP Install c-Class Server Blade Service
This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware is installed smoothly, efficiently, and with minimal disruption of your IT and business operations.

Service and Support

Related Services	**HP Proactive Care Personalized Support - Environmental Option** The Personalized Support option provides an assigned Account Support Manager who can bring best practices from across the industry plus extra technical skills to your IT team. This option is only available as an add-on to HP Proactive Care Support. **HP Proactive Select Service** Provides a flexible way to purchase HP best-in-class consultancy and technical services. You can buy Proactive Select Service Credits when you purchase your hardware and then use the credits over the next 12 months. http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENN.pdf Additional HP Care Pack services can be found at: http://www.hp.com/go/cpc
Insight Online/Insight Remote Support	HP Insight Remote Support provides 24 X 7 remote monitoring, proactive notifications, and problem resolution. This comes at no additional cost with your HP solution. Learn more about Insight Remote Support http://www.hp.com/go/insightremotesupport and Insight Online http://www.hp.com/go/insightonline **NOTE:** Insight Remote Support is a prerequisite for Proactive Care. All blades within a single HP BladeSystem enclosure must be at the same service level.
HP Support Center	Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more http://www.hp.com/go/hpsc HP's Support Center Mobile App allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime. HP Insight Remote Support and HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement. **NOTE:** HP Support Center Mobile App is subject to local availability.
Parts and Materials	HP will provide HP-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements. Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services. The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by HP due to malfunction.
For more information	To learn more on HP ProLiant servers and HP BladeSystem servers, please contact your HP sales representative or HP Authorized ServiceOne Channel Partner. Or visit: www.hp.com/services/bladesystem

Models

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

HP ProLiant BL680c G7 E7-4860 2P 64GB-R Server 643780-B21 **HP ProLiant BL680c G7 E7-4850 2P 64GB-R Server** 643781-B21 **HP ProLiant BL680c G7 E7-4830 2P 64GB-R Server** 643782-B21	**Processor(s)** One of the following depending on Model	(2) Intel® Xeon® E7-4860 (2.26GHz/10-core/24MB, 6.40GT/s QPI, 130W) Processors (2) Intel® Xeon® E7-4850 (2.00GHz/10-core/24MB, 6.40GT/s QPI, 130W) Processors (2) Intel® Xeon® E7-4830 (2.13GHz/8-core/24MB, 6.40GT/s QPI, 105W) Processors
	Cache Memory	24MB L3 cache
	Memory	64GB (8 x 8GB) DDR3-1333 RDIMMs (operating up to 1066MHz) **NOTE:** Total 64 DIMM slots.
	Network Controllers	Six (6) integrated HP NC553i 10Gb FlexFabric adapter ports supporting 10Gb/1Gb autosensing Ethernet, FCoE, Flex-10, TCP/IP offload engine, hardware-based accelerated iSCSI, and iSCSI boot One (1) 10/100 network adapter port dedicated to iLO 3 Management
	Storage Controller	Integrated SAS version 2.0 (6Gb) HP Smart Array P410i Controller with RAID 0, 1, and 1+0 **NOTE:** The P410i is configured with no cache allowing the end user to select the desired cache option (if cache is desired in the first place). This provides RAID 0, 1 and 1+0 in the standard configuration. However, options are available to add RAID 5 and 6; see the "Optional Upgrades" section for P410i options. **NOTE:** RAID 0, 1, and 1+0 are supported on the P410i without the need for a cache option. Four (4) slots for battery cache options. **NOTE:** The server supports up to a combined total of four (4) battery cache options for the P410i and/or optional Smart Array RAID controllers.
	Hard Drives	No drives included; supports up to four (4) hot-plug SFF SAS/SATA/SSD drives
	Internal Storage	SAS: 4.0TB; SATA: 4.0TB; SAS SSD: 3.2TB; SATA SSD: 1.6TB
	Optical Drive	None
	Form Factor	Up to 2 blades in the HP BladeSystem c3000 enclosure Up to 4 blades in the 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 Factory Integrated Model 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 Factory Integrated Model (CTO) Blade.
NOTE: FIO indicates that this option is a Factory Installable Option.

Step 1: Base Server Blade Configuration (Select a configurable Blade)

HP Models	HP ProLiant BL680c G7 W Configure-to-order Server	643785-B21
	Configurable model ships with:	
	Six (6) embedded HP NC553i 10Gb FlexFabric adapter ports supporting autosensing 10Gb/1Gb Ethernet, FCoE, Flex-10, TCP/IP offload engine, hardware-based accelerated iSCSI, and iSCSI boot	
	One (1) 10/100 network adapter port dedicated to iLO 3 Management	
	One (1) Integrated SAS version 2.0 (6Gb) HP Smart Array P410i Controller with RAID 0 and 1 **NOTE:** The P410i is configured with no cache allowing the end user to select the desired cache option (if cache is desired in the first place). This provides RAID 0, 1 and 1+0 in the standard configuration. However, options are available to add RAID 5 and 6; see the "Optional Upgrades" section for P410i options. **NOTE:** RAID 0, 1, and 1+0 are supported on the P410i without the need for a cache option.	
	Four (4) slots for battery cache options. **NOTE:** The server supports up to a combined total of four (4) battery cache options for the P410i and/or optional Smart Array RAID controllers.	
	Four (4) small form factor hot-plug SAS/SATA/SSD hard drive bays	
	Seven (7) I/O expansion slots: six general purpose, and one Ethernet-specific for an additional two "embedded" Ethernet ports	
	One (1) integrated Lights-Out 3	
	Integrated USB, MicroSDHC, and TPM connectors	

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

HP Processors

NOTE: The BL680c G7 supports two, three or four processors. One processor is not supported.
NOTE: All processors within the server must be identical.
NOTE: All Configure-to-Order processor kits contain two (2) processors.
NOTE: If 3 or 4 processors are desired, select one xxxxxx-L21 kit and one (or two) xxxxxx-B21 kit(s).

Ten-Core Processors

HP BL680c G7 Intel® Xeon® E7-4870 (2.40GHz/10-core/30MB/130W) FIO 2-processor Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	643766-L21
HP BL680c G7 Intel® Xeon® E7-4860 (2.26GHz/10-core/24MB/130W) FIO 2-processor Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	643768-L21
HP BL680c G7 Intel® Xeon® E7-4850 (2.00GHz/10-core/24MB/130W) FIO 2-processor Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	643770-L21
HP BL680c G7 Intel® Xeon® E7-8867L (2.13GHz/10-core/30MB/105W) FIO 2-processor Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	643778-L21

Eight-Core Processors

HP BL680c G7 Intel® Xeon® E7-4830 (2.13GHz/8-core/24MB/105W) FIO 2-processor Kit	643772-L21
HP BL680c G7 Intel® Xeon® E7-4820 (2.0GHz/8-core/18MB/105W) FIO 2-processor Kit	643774-L21

Six-Core Processors

HP BL680c G7 Intel® Xeon® E7-4807 (1.86GHz/6-core/18MB/95W) FIO 2-processor Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	643776-L21

HP Memory

NOTE: All DDR3 memory option kits consist of one RDIMM per kit.
NOTE: See the "Memory" section for memory guidelines, installation rules, and additional general information.

HP 4GB (1x4GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500658-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500662-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	604506-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 LP Memory Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	627812-B21
HP 16GB (1x16GB) Quad Rank x4 PC3-8500 (DDR3-1066) Registered CAS-7 Memory Kit	500666-B21
HP 32GB (1x32GB) Quad Rank x4 PC3L-8500 (DDR3-1066) Registered CAS-7 LP Memory Kit **NOTE:** Requires selection of P/N: 643785-B21 in Step 1 above.	627814-B21

Configuration Information - Factory Integrated Models

Step 3: Choose Additional Factory Integration Options

HP Insight Software	HP Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Single Server FIO License	582765-B21

Step 4: Choose Additional Options for Factory Integration

NOTE: For additional options, including server blade enclosures interconnect and mezzanine options and power subsystem options; please see the Core Options and Additional sections below and the following:
HP BladeSystem c3000 Enclosure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12790_na/12790_na.html
HP BladeSystem c7000 Enclosure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.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

Core Options

NOTE: For additional "Core Options" and "Additional Options" please see the options sections below.

HP Ethernet Mezzanine Options	**Gigabit Ethernet Mezzanines**	
	HP NC325m PCI Express Quad Port Gigabit Server Adapter	416585-B21
	HP NC360m Dual Port 1GbE BL-c Adapter	445978-B21
	HP NC364m Quad Port 1GbE BL-c Adapter	447883-B21
	HP NC382m PCI Express Dual Port Multifunction Gigabit Server Adapter	453246-B21
	10 Gigabit Ethernet Mezzanines **NOTE:** A maximum of six dual-port 10Gb Ethernet mezzanine cards may be added for a total of eighteen 10Gb Ethernet ports (6 embedded plus 12 optional). **NOTE:** When installing more than four dual-port 10Gb Ethernet mezzanine cards, an overall Ethernet performance trade-off may be experienced depending on system configuration, application, and optimization. **NOTE:** A 10 Gigabit Ethernet adapter is required for each server blade connecting to a 10Gb interconnect in bays 3-8 (HP BladeSystem c7000 Enclosure) or bays 2-4 (HP BladeSystem c3000 Enclosure). **NOTE:** Each 10 Gigabit Ethernet adapter requires a minimum of 2GB of server memory. **NOTE:** A 10 Gigabit Ethernet adapter will down speed to 1Gb if paired with a 1GbE interconnect. **NOTE:** HP recommends 10Gb adapters be installed in a x8 PCIe slot for optimal performance. **NOTE:** The Flex-10 capability requires the use of an HP Virtual Connect Flex-10 10Gb Ethernet module or HP 10GbE Pass-Thru Module.	
	HP NC532m Dual Port 10GbE Multifunction BL-c Adapter	467799-B21
	HP NC542m Dual Port Flex-10 10GbE BL-c Adapter	539857-B21
	HP NC552m 10Gb 2-port Flex-10 Ethernet Adapter	610609-B21
	HP NC553m 10Gb 2-port FlexFabric Adapter	613431-B21
HP Fibre Channel Mezzanine Options	**4Gb Fibre Channel mezzanine adapters**	
	Emulex LPe1105 4Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	403621-B21
	QLogic QMH2462 4Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	403619-B21
	8Gb Fibre Channel mezzanine adapters	
	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 BLc Brocade 804 8Gb Fibre Channel Host Bus Adapter	590647-B21

Core Options

HP Processors

NOTE: The BL680c G7 supports two, three, or four processors. One processor is not supported.
NOTE: All processors within the server must be identical.
NOTE: All -B21 processor kits listed below contain one (1) processor.
NOTE: If upgrading an existing BL680c G7 server to a different processor, the server's ROM must be flashed to the latest BIOS prior to the upgrade.

Ten-Core Processors

HP BL680c G7 Intel® Xeon® E7-4870 (2.40GHz/10-core/30MB/130W) Processor Kit **NOTE:** This processor is only available on the BL680c G7 Intel Xeon E7-4800 series models.	643766-B21
HP BL680c G7 Intel® Xeon® E7-4860 (2.26GHz/10-core/24MB/130W) Processor Kit **NOTE:** This processor is only available on the BL680c G7 Intel Xeon E7-4800 series models.	643768-B21
HP BL680c G7 Intel® Xeon® E7-4850 (2.00GHz/10-core/24MB/130W) Processor Kit **NOTE:** This processor is only available on the BL680c G7 Intel Xeon E7-4800 series models.	643770-B21
HP BL680c G7 Intel® Xeon® E7-8867L (2.13GHz/10-core/30MB/105W) Processor Kit **NOTE:** This processor is only available on the BL680c G7 Intel Xeon E7-4800 series models.	643778-B21

Eight-Core Processors

HP BL680c G7 Intel® Xeon® E7-4830 (2.13GHz/8-core/24MB/105W) Processor Kit	643772-B21
HP BL680c G7 Intel® Xeon® E7-4820 (2.0GHz/8-core/18MB/105W) Processor Kit	643774-B21

Six-Core Processors

HP BL680c G7 Intel® Xeon® E7-4807 (1.86GHz/6-core/18MB/95W) Processor Kit **NOTE:** This processor is only available on the BL680c G7 Intel Xeon E7-4800 series models.	643776-B21

HP Memory

NOTE: All DDR3 memory option kits consist of one RDIMM per kit.
NOTE: See the "Memory" section for memory guidelines, installation rules, and additional general information.

HP 4GB (1x4GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500658-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500662-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604506-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 LP Memory Kit	627812-B21
HP 16GB (1x16GB) Quad Rank x4 PC3-8500 (DDR3-1066) Registered CAS-7 Memory Kit	500666-B21
HP 32GB (1x32GB) Quad Rank x4 PC3L-8500 (DDR3-1066) Registered CAS-7 LP Memory Kit	627814-B21

HP Hard Drives

NOTE: The components of a storage subsystem (e.g. the drive, the HBA/controller, firmware, and the server backplane) should operate at the same data transfer rate or the system bandwidth will be negotiated down to an acceptable level for all components.

Core Options

NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.
NOTE: A minimum of two drives are required for RAID 0 and 1, three dries for RAID 5, and four drives for RAID 1+0 and 6.
NOTE: SAS, SATA, and/or SSD drives cannot be mixed within the server.

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) Hot Plug Enterprise 3 yr 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
SAS Hot Plug SFF (2.5-inch) Midline (MDL) Drives	
HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	605835-B21
HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507610-B21
NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/12244_na/12244_na.html	
SATA Hot Plug SFF (2.5-inch) Midline (MDL) Drives	
HP 1TB 3G SATA 7.2K rpm SFF (2.5-inch) Hot Plug Midline 1yr Warranty Hard Drive	625609-B21
HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive	507750-B21
NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/13021_na/13021_na.html	
6G SAS Hot Plug Enterprise Performance Solid State Drives	
HP 400GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632494-B21
HP 200GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632492-B21
6G SAS ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives	
HP 800GB 6G SAS Mainstream Endurance SFF 2.5-in Enterprise Mainstream 3yr Warranty Solid State Drive	690823-B21
HP 400GB 6G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream 3yr Warranty Solid State Drive	690821-B21
HP 200GB 6G SAS Mainstream Endurance SFF 2.5-in Enterprise Mainstream 3yr Warranty Solid State Drive	690819-B21
SATA Hot Plug 2.5" Enterprise Mainstream Solid State Drives	
HP 400GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636597-B21
HP 200GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636595-B21
HP 120GB 3G SATA SFF (2.5-inch) Midline 1yr Warranty Solid State Drive	572073-B21
HP 100GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636593-B21

Core Options

NOTE: Please see the QuickSpecs for additional information:
http://h18000.www1.hp.com/products/quickspecs/14038_na/14038_na.html

Additional Options

HP Insight Software	**Insight Control**	
	HP Insight Control including 1yr 24x7 Technical Support and Updates Electronic License	T9074BAE
	HP Insight Control including 1yr 24x7 Technical Support and Updates Single Server License	452148-B22
	HP Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Electronic License	TC278AAE
	HP Insight Management Media Kit **NOTE:** HP Insight Management Media Kit contains DVDs without licenses. Contains HP Systems Insight Manager, HP Insight Control, HP Matrix Operating Environment, and Virtual Connect Enterprise Manager software. Uses an integrated installer to perform quick and accurate software installation and updates. **NOTE:** Licenses ship without media. The Insight Control Media Kit can be ordered separately, or can be downloaded at: http://www.hp.com/go/insightupdates. **NOTE:** Electronic licenses can be used to purchase multiple licenses with a single activation key. **NOTE:** Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support Service. **NOTE:** For additional License Kits, please see the QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/12631_na/12631_na.html	436222-B21
	HP Integrated Lights-Out (iLO) Advanced for ProLiant BladeSystem Remote Management	
	HP iLO Advanced Blade Electronic License with 3yr 24x7 Tech Support and Updates	BD503AAE
	HP iLO Advanced Blade 1 Server License with 3yr 24x7 Tech Support and Updates	BD502A
	HP iLO Advanced for BladeSystem including 1yr 24x7 Support Electronic License	TA851AAE
	HP iLO Advanced for BladeSystem including 1yr 24x7 Support Single Server License **NOTE:** Licenses ship without media. **NOTE:** Electronic licenses can be used to purchase multiple licenses with a single activation key. **NOTE:** Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support Service **NOTE:** For additional license kits, including electronic delivery options, please see the iLO QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/12362_na/12362_na.html	512488-B21
	HP Insight Control server deployment	
	HP Insight Control Server Deployment including 1yr 24x7 Support Electronic License	T9082AAE
	HP Insight Control Server Deployment including 1yr 24x7 Support Single Server License **NOTE:** Licenses ship without media. **NOTE:** Electronic licenses can be used to purchase multiple licenses with a single activation key. **NOTE:** Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support Service. **NOTE:** For additional license kits please see the Insight Control QuickSpecs at:	452151-B21

Additional Options

http://h18004.www1.hp.com/products/quickspecs/12631_na/12631_na.html

High Performance Clusters	**HP Cluster Management Utility**	
	HP Insight Cluster Management Utility 1yr 24x7 Flexible License **NOTE:** This part number can be used to purchase one certificate for multiple licenses with a single activation key. Each license is for one node (server). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key.	QL803B
	HP Insight Cluster Management Utility 3yr 24x7 Flexible License **NOTE:** These part numbers can be used to purchase one certificate for multiple licenses and support with a single activation key. Each license is for one node (server). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key. Customer also will receive a support agreement.	BD476A
	HP Insight Cluster Management Utility Media **NOTE:** Order a minimum of one license per cluster to purchase media including software and documentation, which will be delivered to the customer, and also licenses Insight CMU management. No license key is delivered or required. **NOTE:** For additional license kits please see the QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12612_na/12612_na.html	BD477A
	HP HPC Linux Value Pack	
	HP High Performance Computing Linux Value Pack 1 Processor Flexible License for ProLiant Servers **NOTE:** This part number can be used to purchase one certificate for multiple licenses with a single activation key. Each license is for one socket (a.k.a. processor). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key.	TC293B
	HP High Performance Computing Linux Value Pack Media Kit for ProLiant Servers **NOTE:** This part number can be used to purchase media including software and documentation, which will be delivered to the customer. **NOTE:** For additional license kits please see the QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/13485_na/13485_na.html	TC294A

Additional Options

HP Storage Controllers

NOTE: The P410i is configured with no cache allowing the end user to select the desired cache option (if cache is desired in the first place). This provides RAID 0, 1 and 1+0 in the standard configuration. However, options are available to add RAID 5 and 6; see the "Optional Upgrades" section below for P410i options.
NOTE: RAID 0, 1, and 1+0 are supported on the P410i without the need for a cache option.

NOTE: The server supports up to a combined total of four (4) battery cache options for the P410i and/or optional Smart Array RAID controllers.

HP Smart Array P700m Controller

HP Smart Array P700m/512 4-ports Ext PCIe x8 SAS Controller	508226-B21

HP Smart Array P711m Controller

HP Smart Array P711m/1G 6Gb FBWC 4-ports Ext Mezzanine SAS Controller	513778-B21

HP Smart Array P712m Controller

HP Smart Array P712m/256 6Gb 2-ports Int/2-ports Ext Mezzanine SAS Controller	488348-B21

Optional Upgrades

HP 512MB Flash Backed Write Cache **NOTE:** This is an option for the HP Smart Array P410i Controller (P410i is standard integrated controller).	534916-B21
HP 1GB Flash Backed Cache **NOTE:** This is an option for the HP Smart Array P410i Controller (P410i is the standard integrated controller).	534562-B21
HP Smart Array P-Series Low Profile Battery **NOTE:** Supports the HP Smart Array P700m Controller.	452348-B21
HP Smart Array Advanced Pack including 1yr 24x7 Technical Support and Updates Single Server License	516471-B21

NOTE: The above Smart Array Advanced Pack and above cache option are required to enable Smart Array Advanced Pack features, including RAID 6, on the P410i. For more information go to: http://www.hp.com/go/saap.

NOTE: The Smart Array Advanced Pack is hosted on the P410i Smart Array Controller hardware firmware stack.

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/13175_na/13175_na.html
(Smart Array P700m Controller)
http://h18000.www1.hp.com/products/quickspecs/14035_na/14035_na.html
(Smart Array P711m Controller)
http://h18000.www1.hp.com/products/quickspecs/13296_na/13296_na.html
(Smart Array P712m Controller)
http://h18000.www1.hp.com/products/quickspecs/13200_na/13200_na.html
(Smart Array Advanced Pack)

Additional Options

HP I/O Expansion Options	HP 320GB IO Accelerator for BladeSystem c-Class	AJ878B
	HP 640GB IO Accelerator for BladeSystem c-Class	BK836A
	NOTE: Please see the QuickSpecs for technical specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/13220_na/13220_na.html	
HP InfiniBand Mezzanine Options	HP 4X QDR QLogic InfiniBand Dual Port Mezzanine HCA for c-Class BladeSystem	583210-B21
	HP 4X QDR InfiniBand ConnectX-2 Dual Port Mezzanine HCA for c-Class BladeSystem	592519-B21
HP USB and SD Options	HP USB 2-Button Optical Scroll Mouse	DC172B
	HP USB 04 Standard Keyboard	DT528A#ABA
	HP 2GB USB Flash Media Drive Key Kit **NOTE:** HP qualified blank USB key for use with HP ProLiant servers that support the VMware virtualization environment. HP recommends this industry standard USB flash device for use with VMware ESXi. USB device must be installed in the internal slot of the ProLiant server for use with VMware ESXi. Refer to HP VMware Getting Started Guide for installation instructions.	608447-B21
	HP 4GB Micro SDHC Flash Media Kit **NOTE:** Blank SD media devices are supported for use with VMware and Citrix. SD media must be installed in the internal slot of the ProLiant server. Learn more at: http://www.hp.com/go/proliantvirtualization.	647444-B21
HP Security	HP Trusted Platform Module Option	488069-B21
	NOTE: The BL680c G7 server includes a Trusted Platform Module (TPM) connector for an optional TPM 1.2 upgrade. The TPM 1.2 option is a microcontroller chip that can securely store artifacts used to authenticate the server platform. These artifacts can include passwords, certificates and encryption keys. Windows® BitLocker™ Drive Encryption (BitLocker) is a data protection feature available in Windows Server® 2008. BitLocker leverages the enhanced security capabilities of TPM version 1.2. The TPM works with BitLocker to help protect user data and to ensure that a server operating Windows Server 2008 has not been tampered with while the system was offline. **NOTE:** For more information about TPM, including a white paper, go to: http://www.hp.com/go/TPM. **NOTE:** ProLiant OS pre-installed units will come with the partition required for TPM deployment. **NOTE:** The TPM key is unique to every TPM deployed server and must be retained. Misplacing or losing the key could result in data loss.	

Additional Options

HP Care Pack Services	**Proactive Care** - Collaborative Support plus Proactive services delivered by the on shore/near shore Advanced Solution Center (ASC) and backed by the global delivery organization, end-to-end case ownership from a Technical Solution Specialists and Technical Account Manager who remotely delivers firmware/software revision management, proactive scans and incident trend reports. Recommended for customers running a virtualized infrastructure and/or customers who desire an enhanced call support experience.	
	HP 3 year 4 hour 24x7 ProLiant BL6xxc Proactive Care Service	U3B32E
	HP 3 year 4 hour 24x7 with Defective Media Retention ProLiant BL6xxc Proactive Care Service	U3B35E
	HP 3 year 6 hour Call To Repair 24x7 ProLiant BL6xxc Proactive Care Service	U3B38E
	HP 3 year 6hr Call To Repair 24x7 with Defective Media Retention ProLiant BL6xxc Proactive Care SVC	U3B41E
	Proactive Care Personalized Support Environmental Option - to add an onsite Account Support Manager (ASM) to Proactive Care. ASM is an assigned resource who delivers support planning and brings technical expertise and best practices advice for the customer's environment.	
	HP 3yr Provides annual personalized proactive supp for existing Proactive Care ISS centric environment	U6W98E
	Installation Services - reduce the time required to get your system up and running and help minimize disruptions to your business.	
	HP Install c-Class Server Blade Service	UE493E
	HP Installation during Non Standard Hours c-Class Server Blade Service	UG869E
	Additional HP Care Pack services can be found at: http://www.hp.com/go/cpc	

Memory

Memory Subsystem Architecture

For maximum memory bandwidth, performance, and capacity, each processor socket contains two memory controllers. Each memory controller connects to two Intel® Scalable Memory Buffers (SMB) for a total of four SMBs per processor. Each SMB connects to four RDIMMs for grand total of sixteen RDIMMs per installed processor (64 RDIMMs total per BL680c G7 server) providing up to 2.0TB of memory (32GB RDIMMs x 64 DIMM slots).

All RDIMMs will operate at the highest possible speed for a given processor. Memory speed is not affected by number of RDIMMs or ranks. However, memory speed is a function of the processors QPI bus speed per the following:

- Processors with a QPI speed of 6.40GT will operate memory at 1066MHz
- Processors with a QPI speed of 5.86GT will operate memory at 978MHz
- Processors with a QPI speed of 4.80GT will operate memory at 800MHz

DDR3 and DDR3L Memory Population Guidelines

An overview of the RDIMM installation guidelines are summarized below. For detailed memory configuration rules and guidelines, please see the BL680c G7 user guide at: www.hp.com/support and the Online DDR3 Memory Configuration Tool at: www.hp.com/go/ddr3memory-configurator

1. Install only HP BL680c G7 supported DDR3 and DDR3L RDIMMs.
2. RDIMMs must be installed for processor 1.
3. Populate RDIMM slots for a processor only if the processor is installed.
4. To maximize performance in multi-processor configurations, distribute the total memory capacity between all processors as evenly as possible.
5. The minimum configuration is two RDIMMs installed on processor 1.
6. RDIMMs must be installed in pairs with identical characteristics. When possible, for configuration simplicity, HP recommends using RDIMMs with identical part numbers throughout the system.
7. For best performance, HP recommends that RDIMM pairs be populated in sequence by letter designation. Install RDIMM pair (4A, 5A) first, followed by RDIMM pair (12B, 16B), RDIMM pair (2C, 7C), RDIMM pair (10D, 14D), RDIMM pair (3E, 6E), RDIMM pair (11F, 15F), and RDIMM pair (1G, 8G).
8. When installing mixed rank RDIMMs for any processor, RDIMMs with the highest number of ranks must be installed in the white RDIMM connector locations. This guarantees proper electrical signaling on the DDR3 channel since RDIMMs with higher rank counts present larger electrical loading on the DDR3 channel and must be populated at the end point of the channel.
9. 1.5V DDR3 and 1.35V DDR3L RDIMMs may be installed within the same socket. In this case, all RDIMMs on that socket will operate at 1.5V.
10. The BL680c G7 supports memory hemisphere mode (for a high-performance memory interleaving technology) as well as several advanced memory modes (AMP) including advanced ECC, online spare, and mirrored memory. Please see the BL680c G7 user guide at: www.hp.com/support for a description of each of these features and their memory configuration guidelines.
11. There are several additional recommended steps for memory performance optimization, please see the BL680c G7 user guide at: www.hp.com/support for a complete list.

Standard Memory

64GB (8 x 8GB) of dual-rank DDR3-1066 RDIMMs

Standard Memory Plus Optional Memory

Up to 1.8TB of memory is available with the installation of optional DDR3 RDIMM memory expansion kits

Standard Memory Replaced with Optional Memory

Up to 2.0TB of memory is available with the removal of standard memory and the installation of optional DDR3 RDIMM memory expansion kits

Memory

ProLiant BL680c G7 Memory Configurations

Memory		Processor 1 and 2 RDIMM Slots (Processors 3 and 4 have the same DIMM slot numeration, but all slots are empty)							
Standard	**32GB per CPUs 1 and 2 (64GB total)**	**1G**	**2C**	**3E**	**4A**	**5A**	**6E**	**7C**	**8G**
		Empty	Empty	Empty	8GB	8GB	Empty	Empty	Empty
		9H	**10D**	**11F**	**12B**	**13H**	**14D**	**15F**	**16B**
		Empty	Empty	Empty	8GB	Empty	Empty	Empty	8GB
		Processor 1 and 2 RDIMM Slots (Processors 3 and 4 DIMM slots are all populated with 32GB DIMMs)							
Optional	**416GB per CPUs 1 and 2, 512MB per CPUs 3 and 4 (1.8TB total)**	**1G**	**2C**	**3E**	**4A**	**5A**	**6E**	**7C**	**8G**
		32GB	32GB	32GB	8GB	8GB	32GB	32GB	32GB
		9H	**10D**	**11F**	**12B**	**13H**	**14D**	**15F**	**16B**
		32GB	32GB	32GB	8GB	32GB	32GB	32GB	8GB
		Processor 1 through 4 RDIMM Slots							
Maximum	**512GB per CPU (2.0TB total)**	**1G**	**2C**	**3E**	**4A**	**5A**	**6E**	**7C**	**8G**
		32GB	32GB	32GB	32GB	32GB	32GB	32GB	32GB
		9H	**10D**	**11F**	**12B**	**13H**	**14D**	**15F**	**16B**
		32GB	32GB	32GB	32GB	32GB	32GB	32GB	32GB

HP ProLiant BL680c G7 memory options:

HP Memory

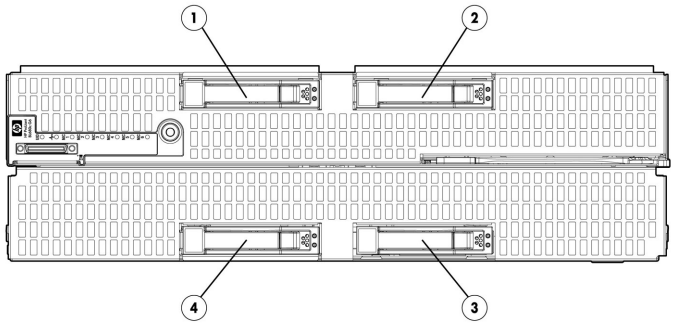
The following are the BL680c G7 memory options available from HP:

HP 4GB (1x4GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500658-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-10600 (DDR3-1333) Registered CAS-9 Memory Kit	500662-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 Low Power Memory Kit	604506-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 LP Memory Kit	627812-B21
HP 16GB (1x16GB) Quad Rank x4 PC3-8500 (DDR3-1066) Registered CAS-7 Memory Kit	500666-B21
HP 32GB (1x32GB) Quad Rank x4 PC3L-8500 (DDR3-1066) Registered CAS-7 LP Memory Kit	627814-B21

NOTE: All DDR3 memory option kits consist of one DIMM per kit.

NOTE: For detailed memory configuration rules and guidelines, please see the BL680c G7 user guide at: www.hp.com/support and use the Online DDR3 Memory Configuration Tool at: www.hp.com/go/ddr3memory-configurator.

Storage



1-4 4 x SFF SAS/SATA/SDD hot-plug hard drives

Hard Drives

NOTE: The components of a storage subsystem (e.g. the drive, the HBA/controller, firmware, and the server backplane) should operate at the same data transfer rate or the system bandwidth will be negotiated down to an acceptable level for all components.

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

NOTE: SAS, SATA, and/or SSD drives cannot be mixed within the server.

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

	Quantity Supported	Position Supported	Controller
900GB 6G SAS 10K 600GB 6G SAS 10K 450GB 6G SAS 10K 300GB 6G SAS 15K 300GB 6G SAS 10K 146GB 6G SAS 15K	4	1-4	Smart Array P410i Controller

SAS Hot Plug SFF (2.5-inch) Midline (MDL) Drives

	Quantity Supported	Position Supported	Controller
1.0TB 6G SAS 7.2K 500GB 6G SAS 7.2K	4	1-4	HP Smart Array P410i Controller

SATA Hot Plug SFF (2.5-inch) Midline (MDL) Drives

	Quantity Supported	Position Supported	Controller
1.0TB 3G SATA 7.2K 500GB 3G SATA 7.2K 160GB 3G SATA 7.2K	4	1-4	HP Smart Array P410i Controller

SATA Hot Plug 2.5" Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
400GB 3G SATA MLC SFF 200GB 3G SATA MLC SFF	4	1-4	HP Smart Array P410i Controller

6G SAS Hot Plug Enterprise Performance Solid State Drives

Storage

	Quantity Supported	Position Supported	Controller
400GB 6G SAS SLC 200GB 6G SAS SLC	4	1-4	HP Smart Array P410i Controller

6G SAS ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 6G SAS ME 400GB 6G SAS ME 200GB 6G SAS ME	4	1-4	HP Smart Array P410i Controller

Technical Specifications

System Unit	**Dimensions** (H x W x D)	Full height, double-wide server blade: 14.46 x 4.22x 20.09 in (36.73 x 10.72 x 51.03 cm)	
	Weight (approximate)	Maximum (all hard drives, DIMMs, mezzanine cards, and processors installed)	47.96lbs (21.75kg)
		Minimum (two hard drives, four DIMMs, no mezzanine cards, and two processors installed)	35.13lbs (15.93kg)
	Power Specifications	For power specifications including input requirements, BTU rating, and power supply output, please see the HP BladeSystem c-Class Enclosures QuickSpecs located at: HP BladeSystem c3000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12790_na/12790_na.html HP BladeSystem c7000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.html To review typical system power ratings use the HP BladeSystem Power Sizer available at: http://www.hp.com/go/bladesystem/powercalculator.	
	System Inlet Temperature	Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1000 ft) above sea level to a maximum of 3050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).
		Non-Operating	-30° to 60°C (-22° to 140°F), maximum rate of change is 20°C/hr (36°F/hr).
	Relative Humidity (non-condensing)	Operating	10 to 85% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.
		Non-Operating	10 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
	Altitude	Operating	3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
		Non-operating	9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).

Technical Specifications

	Acoustic Noise	For acoustic noise specifications, please see the HP BladeSystem c-Class Enclosures QuickSpecs located at: HP BladeSystem c3000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12790_na/12790_na.html HP BladeSystem c7000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12810_na/12810_na.html
Smart Array P410i Controller	**Disk Drive and Enclosure Interface**	6G SAS (Serial Attached SCSI) 3G SATA (Serial Advanced Technology Attachment)
	SAS Connectors	Two (2) internal (SFF8484) x4 wide port connectors
	Cache Memory Speed	DDR2-533MHz with 40 or 72-bit wide bus provides up to 4.2 GB/s maximum bandwidth.
	Server Interface	x4 5G PCIe Gen2 provides 2GB/s maximum bandwidth.
	SAS Speed	x2 6G SAS provides 1.2GB/s maximum bandwidth.
	Cache Memory	72-bit 1GB cache; ECC protection, capacitor-backed
	Logical Drives Supported	Up to 32 logical drives
	Maximum Logical Drive Capacity	2 TB (2 x 1 TB)
	Host Memory Addressing	64-bit, supporting greater than 4GB server memory space
	RAID Support	Standard: RAID 0 (Striping) RAID 1 (Mirroring) RAID 1+0 (Stripping and Mirroring) **NOTE:** RAID 0, 1, and 1+0 are supported on the P410i without the need for a cache option. **NOTE:** A minimum of two drives are required for RAID 0 and 1 and four drives for RAID 1+0. Optional: RAID 5 (Distributed Data Guarding) RAID 6 (Advanced Data Guarding) **NOTE:** A minimum of three drives for RAID 5 and four drives for RAID 6.
	Upgradeable Firmware	Upgradeable firmware with recovery ROM capability

Technical Specifications

Integrated HP NC553i 10Gb FlexFabric Adapter	**Type**	Integrated KR 10GbE with FlexFabric (Flex-10, FCoE, accelerated iSCSI, iSCSI boot, 10GbE, 1GbE, TCP/IP offload engine)
	Network Processor	Blade Engines 3 (BE3)
	Data Transfer Method	x8 PCI Express 2.0
	Network Transfer Rate	20Gbps per port full duplex only (theoretical maximum value) **NOTE:** Each port is autosensing 1Gb / 10Gb, and can interoperate with 1Gb HP BladeSystem c-Class interconnect components. **NOTE:** Each port on the NC553i adapter transmits from the server at 20Gbps (theoretical) full duplex.
	IEEE Compliance	802.1p QoS, 802.1Q VLAN tagging, 802.3ad link aggregation, 802.3ap 10GBase-KR, and 802.3x flow control

	Standard Features	• ProLiant Teaming including Network Fault Tolerance, Transmit Load Balancing, and Switch-Assisted Load Balancing
		• 9K Jumbo frames (4K Jumbo frames when in FCoE mode)
		• Microsoft Windows Receive Side Scaling (RSS)
		• FCoE or accelerated iSCSI mode
		• iSCSI boot
		• Flex-10 support
		• TCP/IP offload engine
		• 10Gb Ethernet ort 1Gb Ethernet autosensing
		• Microsoft TCP chimney compliant
		• Supports 8 Physical Functions (PF)
		• Supports 128 Virtual Functions (VF):
		  ○ Up to 32 VFs per PF
		  ○ Support 128 MAC address
		• Traffic Shaping and QoS across each VF and PF:
		• NIC Fine-grain QoS 10 Mbps to 10Gbps in steps of 10Mbps
		• HBA fine-grain QoS 1000 IOPs to 500,000 IOPs in steps of 1000 IOPS
		• On-chip VM-VM switching
		• Traffic steering and isolation
		• Hardware based filtering for 128 VLANIDs with QinQ tag filtering
		• Protection against denial-of-service attacks & malfunctioning VMs

HP Integrated Lights-Out 3 (iLO 3)	**Architecture**	PCI Express based health and remote management ASIC
	Processor	PCI Express RISC processor core operating at 250MHz
	Upgradeability	Option firmware upgradeable via Flash ROM
	Video Support	1600 x 1200 DVR max resolution
	Interfaces	One Ethernet network connection (10/100Mbps)
	Memory	128-MB DDR with ECC
	Operating System Support	Microsoft Windows 2008 R2 Microsoft Windows 2008 (32 bit and 64 bit) Microsoft Windows Server 2008 Standard Edition (32bit and 64bit) Microsoft Windows Server 2008 Enterprise Edition (32bit and 64bit) Microsoft Windows Server 2003 and Windows Server 2003 R2, and Windows Server 2003 for Extended Systems Standard Edition, Enterprise Edition

	Red Hat Enterprise Linux 5.4 (32bit and 64bit)
	SUSE LINUX Enterprise Server 11 (32bit and 64bit)
	SUSE LINUX Enterprise Server 10 (32bit and 64bit)
	VMware ESX 4.0
	VMware ESX 3.5.0
	Microsoft Windows 2008 R2
Client System Support	Microsoft Windows 7
	Microsoft Windows XP Professional Edition
	Microsoft Windows Vista Business and Ultimate Editions
	Red Hat Enterprise Desktop 5.00
	SUSE Linux Enterprise Desktop 11
	SUSE Linux Enterprise Desktop 10
Client Browser Support	Microsoft Internet Explorer 8
	Microsoft Internet Explorer 7
	Microsoft Internet Explorer 6
	Firefox 3.5 (on supported Windows and Linux systems)
	Firefox 3.0 (on supported Windows and Linux systems)
Command Line Support	Secure Shell and serial port access
	Secure Socket Layer
	Secure Shell version 2
Security	Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser, CLP and XML scripting interface
	AES encryption of video
	RC4 encryption of video
Directory Support Services	Active Directory v1.0 (Windows 2003)
Driver Support	HP ProLiant iLO3 Management Controller Driver Package
Management protocols supported	SNMP, IPMI 2.0 (system and LAN interface), DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP), HP RIBCL XML

Technical Specifications

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.

For hard drives, 1GB = 1 billion bytes (1,000 MB). Actual formatted capacity is less.