



Eight steps to building an HPE BladeSystem





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HPE BladeSystem overview

HPE BladeSystem with HPE OneView delivers a whole new experience for IT with the Power of One—one infrastructure, one management platform to speed the delivery of services. Only the Power of One delivers leading infrastructure convergence, availability with federation, and agility through data center automation. HPE BladeSystem helps you lower data center costs by 68 percent,¹ so you can shift investment from routine maintenance to innovation, maximize availability by reducing downtime up to 90 percent,² and accelerate enterprise workload deployment such as virtualization and cloud computing up to 66X faster.³

HPE BladeSystem delivers real business results

HPE BladeSystem is a modular infrastructure platform that converges servers, storage, and network fabric to accelerate operations and speed delivery of applications and services running in physical, virtual, and cloud-computing environments. Because the core infrastructure is shared, capital costs can be significantly lower. Blades share power, cooling, network, and storage infrastructure at the BladeSystem enclosure level. Since equipment is not needed for each server, there is a dramatic reduction in power distribution units (PDUs), power cables, LAN and SAN switches, connectors, adapters, and cables. And you can bring in the newest-generation technologies by simply changing the components that need to be updated.

Making routine HPE BladeSystem infrastructure changes takes up to 90 percent⁴ less time with the wire-once connectivity only available with HPE Virtual Connect. Virtual Connect simplifies and converges your server-edge connections, making server connections transparent to storage and networks. You can reduce server-edge infrastructure, like network interface cards, cables, and switches, by up to 95 percent.⁵ To further simplify connectivity beyond server and storage infrastructures, HPE Virtual Connect FlexFabric modules can be directly connected to HPE 3PAR storage solutions via direct-attach Flat SAN technology, reducing complexity, cost, and latency.

Take control of limited power resources with HPE Intelligent Infrastructure and Thermal Logic technology inside HPE BladeSystem. In fact, you can increase the capacity of your data center without adding power infrastructure and reduce power costs by 36 percent⁶ vs. a traditional environment. HPE Intelligent Infrastructure automates inventory management and power monitoring to speed implementation and reduce operating expenses, while eliminating downtime caused by error-prone manual processes. HPE Thermal Logic technology lets administrators dynamically track and control power limits based on workload demand within the BladeSystem enclosure, so you can reclaim over-provisioned power and cooling capacity without impacting performance. Together, they track location, power, and cooling to give you better insight across your data center for the highest efficiency possible.

Simplified management with HPE OneView delivers unprecedented ease of use, so you can deploy and manage HPE BladeSystem faster, at lower cost, and at greater scale. HPE OneView is the first software platform that creates a modern and integrated workspace for automated lifecycle management of HPE BladeSystem. HPE OneView reduces the needs for multiple management tools and non-management tools, streamlining processes and eliminating common sources of errors.

HPE BladeSystem is the one platform that you can rely on to run virtually any workload at the cost, speed, and reliability your enterprise demands. Only Hewlett Packard Enterprise gives you the simplicity and freedom through the Power of One to build IT that's truly optimized for your business—compute solutions for every-day workloads, converged systems for high-intensity virtualized or cloud workloads, even an entire converged data center. All built on the same HPE BladeSystem foundation, delivered on premise or as a service and backed by Hewlett Packard Enterprise, the worldwide leader in virtualization infrastructure.

Learn how HPE BladeSystem can help you drive business innovation by visiting hpe.com/info/bladesystem.

^{1, 2, 6} IDC white paper sponsored by HP (now Hewlett Packard Enterprise), "Business Value of Blade Infrastructures," #227508R2.

³ Based on data provided by a beta customer. With HPE OneView the beta customer built 12 sites in one night and a new call center deployment in one night vs. the previous way where they could build only two sites at a time and it took 11 days to deploy two sites.

⁴ HPE BladeSystem and BladeSystem Matrix TCO Calculator, roianalyst.alinean.com/hp_roianalyst

⁵ HPE internal calculations comparing the number of hardware components of traditional infrastructure vs. HPE BladeSystem with two Virtual Connect FlexFabric modules—January 2014.

Modular, future-proof design

Hewlett Packard Enterprise's global community of business technology experts and partners is here to help you build a solution and support plan that is just right for your needs. And we do a lot of the hard work for you by integrating the infrastructure essentials inside the BladeSystem. It arrives at your door ready to deliver the best business results.

Building your ideal BladeSystem infrastructure solution begins with these eight simple steps:

- Step 1: Choose your operating environment
- Step 2: Choose your BladeSystem enclosure
- Step 3: Choose your interconnects
- Step 4: Choose your server blades
- Step 5: Choose your storage infrastructure
- Step 6: Choose your infrastructure management
- Step 7: Choose your power and cooling configurations
- Step 8: Choose your services

Step 1: Choose your operating environment

HPE Integrity and HPE ProLiant server blades run in almost the same operating environment as other HPE servers, but with the advantages of a BladeSystem infrastructure. You can mix and match different Integrity and ProLiant server blades and run multiple operating environments in the same enclosure.

Supported operating system (OS) and virtualization software

- Microsoft® Windows®: hpe.com/servers/wincert
- Red Hat® Enterprise Linux® (RHEL): hpe.com/servers/rhelcert
- SUSE Linux Enterprise Server (SLES): hpe.com/servers/slescert
- Oracle Linux Unbreakable Enterprise Kernel: hpe.com/servers/olcert
- Oracle Solaris: hpe.com/servers/solariscert
- Canonical Ubuntu: hpe.com/servers/ubuntucert
- VMware®: hpe.com/servers/vmwarecert

Integrity certifications

- HP-UX 11i: hpe.com/info/hpux
- HPE Integrity NonStop: hpe.com/info/nonstop
- HPE OpenVMS: hpe.com/info/openvms

Purchase your entire operating environment from HPE

Hewlett Packard Enterprise resells and provides full service and support for Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Ubuntu Server, and VMware.

Learn more at hpe.com/info/ossupport.

Step 2: Choose your BladeSystem enclosure

Hewlett Packard Enterprise offers versatile enclosures to match the unique needs of large or small IT environments. The HPE BladeSystem c7000 and c3000 Platinum Enclosures provide all the power, cooling, and I/O infrastructure required to support modular server, interconnect, and storage components.

These enclosures help you simplify the infrastructure, reduce purchase and operating costs, adapt to changing business and infrastructure needs, and significantly lower energy consumption.

Intelligent infrastructure support: Power Discovery Services allows BladeSystem enclosures to communicate information to HPE Intelligent PDUs that automatically track enclosure power connections to the specific iPDU outlet to help ensure redundancy and prevent downtime. Location Discovery Services allows the c7000 to automatically record its exact location in HPE Intelligent Series Racks, eliminating time-consuming manual asset tracking.

HPE BladeSystem **Onboard Administrator** is the built-in enclosure management processor, subsystem, and firmware base used to support the HPE BladeSystem c-Class enclosures and all the managed devices contained within them. Onboard Administrator provides a single point from which to perform management tasks on server blades or switches within the enclosure. Together with the enclosure’s HPE Insight Display, the Onboard Administrator was designed for both local and remote HPE BladeSystem c-Class administration.

This module and its firmware provide:

- Wizards for simple, fast setup and configuration
- Highly available and secure local or remote access to the HPE BladeSystem infrastructure
- Security roles for server, network, and storage administrators
- Automated power and cooling of the enclosure
- Agentless device health and status
- Power and cooling information and control

Each enclosure ships with an Onboard Administrator module/firmware. HPE BladeSystem Platinum Enclosures can be configured with redundant Onboard Administrator modules to provide uninterrupted manage ability of the entire enclosure and blades. When two Onboard Administrator modules are present, they work in an active-standby mode, assuring full redundancy of the enclosure’s integrated management.



HPE BladeSystem c3000 Platinum Enclosure

Smaller, versatile design ideal for offices or branch locations that only need up to eight server or storage components at a time. Uses a standard power outlet, doesn’t require special air conditioning, and includes features designed to help small staffs be more productive with less effort.



HPE BladeSystem c7000 Platinum Enclosure

Larger, modular block of infrastructure ideal for bigger data centers. Holds up to 16 types of server and storage blades and offers twice as many interconnect expansion slots to run nearly any application in a dynamic, high-performance IT environment.

Device bays	Up to 8 server and storage blades, mixed configurations supported	Up to 16 server and storage blades, mixed configurations supported
Interconnect bays	4 (up to 2 redundant I/O fabrics)	8 (up to 4 redundant I/O fabrics)
Power supplies	Up to (6) 1200 W (N+1 or N+N and 80 PLUS Certified)	Up to (6) 2250 W, 2450 W, or 2650 W (N+1 or N+N and 80 PLUS Certified)
Fans	Up to 6 hot-plug Active Cool fans	Up to 10 hot-plug Active Cool fans
Onboard Administrator	Up to 2	Up to 2
Height	6U	10U

Find a complete list of supported options at hpe.com/servers/bladeSystem/enclosures

Step 3: Choose your interconnects

HPE Virtual Connect is an essential building block for any virtualized or cloud-ready environment. This innovative, wire-once HPE connection management simplifies server connectivity, making it possible to add, move, and change servers in minutes vs. hours or days. Virtual Connect is the simplest way to connect servers to any network and reduces network sprawl at the edge by up to 95 percent.⁷

Find a complete list of products in the Virtual Connect portfolio at hpe.com/info/virtualconnect.

Whether you need basic network connectivity for a remote office, or a high-bandwidth, low-latency link for a high-performance computing cluster, you can count on HPE Ethernet switches to provide the solution, from simple-to-configure 1 Gb and 1 Gb/10 Gb, or a powerful 40 Gb switch designed for handling data from today's multi-processor virtualized servers.

Find a complete list of products in the Interconnects portfolio at hpe.com/servers/blades/interconnects.

For a complete list of Interconnect products supported by HPE OneView, please consult the [HPE OneView Support Matrix](#).

⁷ HPE internal calculations comparing the number of hardware components of traditional infrastructure vs. HPE BladeSystem with two Virtual Connect FlexFabric modules—January 2014.

Interconnects: Virtual Connect modules



HPE Virtual Connect 16 Gb 24-Port Fibre Channel Module



HPE Virtual Connect 8 Gb 20-Port Fibre Channel Module



HPE Virtual Connect 8 Gb 24-Port Fibre Channel Module

Blade type	Single bay	Single bay	Single bay
Network connections	16 internal 16/8 Gb downlinks presented as F-Ports 8 external 16/8/4 Gb uplinks presented as N-Ports	16 internal 8 Gb downlinks presented as F-Ports 4 external 8 Gb uplinks presented as N-Ports	16 internal 8 Gb downlinks presented as F-Ports 8 external 8 Gb uplinks presented as N-Ports
Media types	Small form-factor pluggable (SFP) laser HPE B-series 16 Gb SFP+ Short Wave Transceiver HPE B-series 8 Gb SFP+ Short Wave Transceiver	Small form-factor pluggable (SFP) laser 2/4/8 Gb short wave up to 500 m (1,640 ft) 1/2/4 Gb long wave up to 10 km	Small form-factor pluggable (SFP) laser 1/2/4 Gb short wave, long wave SFP+ 2/4/8 Gb short wave, long wave
Performance	16 Gb/s line speed, full duplex 0.7 µs latency Maximum frame size 2112-byte payload Buffer-to-buffer flow control management packet prioritization	8 Gb/s line speed, full duplex 1.2 µs latency Maximum frame size 2112-byte payload Buffer-to-buffer flow control management packet prioritization	8 Gb/s line speed, full duplex .74 µs latency Maximum frame size 2148 bytes (2112-byte payload)
Protocol support	NCITS T11 NPIV	NCITS T11 NPIV	NCITS T11 NPIV
Management	Simple and intuitive GUI and setup wizards accessible through VC Ethernet module CLI accessible through VC Ethernet module Embedded SNMP v1 and v2 SMI-S, Virtual Connect Manager, HPE OneView	Simple and intuitive GUI and setup wizards accessible through VC Ethernet module CLI accessible through VC Ethernet module Embedded SNMP v1 and v2 SMI-S, Virtual Connect Manager, HPE OneView	Simple and intuitive GUI and setup wizards accessible through VC Ethernet module CLI accessible through VC Ethernet module Embedded SNMP v1 and v2 SMI-S, Virtual Connect Manager, HPE OneView
Extended management features	Virtual Connect Manager supports HPE Storage Essentials (FC Management MIB)	Virtual Connect Manager supports HPE Storage Essentials (FC Management MIB)	Virtual Connect Manager supports HPE Storage Essentials (FC Management MIB)
High-availability features	N-port trunking support for uplinks when connecting with Brocade SAN switches Automatic loop protection Mirrored profile database Multi-path heartbeat between redundant modules	Link Aggregation Protocol Automatic loop protection Mirrored profile database Multi-path heartbeat between redundant modules	Link Aggregation Protocol Automatic loop protection Mirrored profile database Multi-path heartbeat between redundant modules
Security	LDAP, SSL, role-based management	LDAP, SSL, role-based management	LDAP, SSL, role-based management
Maximum per enclosure	6	6	6
Part number	751465-B21 778720-B21 (TAA-compliant)	572018-B21	466482-B21
Warranty in year(s) (parts/labor/onsite)	1/1/1	1/1/1	1/1/1

Interconnects: Virtual Connect modules (continued)



HPE Virtual Connect FlexFabric-20/40 F8 Module



HPE Virtual Connect FlexFabric 10 Gb/24-Port Module



HPE Virtual Connect Flex-10/10D Module

	HPE Virtual Connect FlexFabric-20/40 F8 Module	HPE Virtual Connect FlexFabric 10 Gb/24-Port Module	HPE Virtual Connect Flex-10/10D Module
Blade type	Single bay	Single bay	Single bay
Network connections	16 x 10/20 Gb downlinks to servers, 2 x 20 Gb cross connects 4 x 40 Gb SR, LR fiber, DAC and AOC QSFP+ including DAC splitter cable uplinks 8 x 10 Gb external SR, LR fiber, and copper uplinks SFP+ (Ethernet/FC) 1 internal interface to BladeSystem c-Class Onboard Administrator Module	16 x 10 Gb downlinks to servers, 2 x 10 Gb cross connects 4 x 10 Gb external SR, LR fiber, and copper uplinks SFP+ (Ethernet/FC) 4 x 10 Gb external SR, LRM, and LR fiber and copper uplinks SFP+ (Ethernet) 1 internal interface to c-Class Onboard Administrator Module Direct attach to HPE 3PAR with HPE Flat SAN technology	16 x 10 Gb downlinks midplane 4 x 10 Gb cross connect 10 x 10 Gb SR, LR, or LRM fiber uplinks SFP+ 1 internal interface to c-Class Onboard Administrator Module
Media types	FCSFP/SFP+, 2/4/8 Gb short wave up to 500 m, 1/2/4 Gb long wave up to 10 km, Ethernet SFP/SFP+/QSFP+, 10GbE SR, LR, and LRM, 10GbE copper direct-attached cable, 40GbE SR, LR and direct-attached cable both DAC and AOC, HPE 10 m C-series Active Copper SFP+ Cable, HPE BLc 40G QSFP+ to QSFP+ 7 m, 10 m, 15 m AOC cable, HPE BLc QSFP+ 4 to 4 x 10 SFP+ 7 m, 10 m, 15 m AOC splitter cable, HPE X242 SFP+ 3 m, 5 m, 7 m, 15 m DAC Cable, HPE X242 QSFP+ 1 m, 3 m, 5 m DAC Cable, HPE X242 QSFP+ 4 to 4 x 10 SFP+ 1 m, 3 m, 5 m DAC splitter Cable	FCSFP/SFP+, 2/4/8 Gb short wave up to 500 m, 1/2/4 Gb long wave up to 10 km, Ethernet SFP/SFP+, 10GbE SR, LR, and LRM, 10GbE copper direct-attached cable, 1GbE SX, 1GbE 1000 BASE-T copper, HPE 7 m C-series Active Copper SFP+ Cable, HPE 10 m C-series Active Copper SFP+ Cable, HPE X242 SFP+ 15 m DAC Cable, HPE X242 SFP+ 7 m DAC Cable	SFP+ SR, LR, LRM SFP SX, RJ45, SFP+ Copper, HPE 7 m C-series Active Copper SFP+ Cable, HPE 10 m C-series Active Copper SFP+ Cable, HPE X242 SFP+ 15 m DAC Cable, HPE X242 SFP+ 7 m DAC Cable
Performance	Line rate, full-duplex 1.2 Tb/s bridging fabric, 1.0 μs on Ethernet-only ports; 1.8 μs on Ethernet/FC ports; maximum Ethernet frame size 9216 (jumbo frame); maximum FC frame size 2148 bytes (2,112 byte payload); buffer-to-buffer flow control management; packet prioritization	Line rate, full-duplex 480 Gb/s bridging fabric; 1.5 μs on Ethernet-only ports; 2.0 μs Ethernet/FC ports; maximum Ethernet frame size 9216 (jumbo frame); maximum FC frame size 2148 bytes (2112 byte payload); buffer-to-buffer flow control management; packet prioritization	Line rate, full-duplex 600 Gb/s bridging fabric, less than 1.0 μs with Ethernet-only ports; maximum Ethernet frame size 9216 (jumbo frame)
Protocol support	IEEE 802.1Qbb (preliminary), 802.1Qaz (preliminary), 802.1AB, 802.1D, 802.1Q, IEEE 802.2, IEEE 802.3ad INCITS FC-BB5 Rev 2.00, INCITS T11 NPIV, SR-IOV, FC-BB5 (single-hop and dual-hop)	IEEE 802.1Qbb (preliminary), 802.1Qaz (preliminary), 802.1AB, 802.1D, 802.1Q, IEEE 802.2, 802.3ad, INCITS FC-BB5 Rev 2.00, INCITS T11 NPIV, FC-BB5	IEEE 802.1Qbb (preliminary), 802.1Qaz (preliminary), 802.1AB, 802.1D, 802.1Q, IEEE 802.2, 802.3ad, FC-BB5
Management	Simple and intuitive GUI and setup wizards; embedded SNMP v1, v2, v3; SMI-S, Virtual Connect Manager, HPE OneView IPv6 and sFlow®	Simple and intuitive GUI and setup wizards; embedded SNMP v1, v2, v3; SMI-S, Virtual Connect Manager, HPE OneView	Simple and GUI and setup wizards; embedded SNMP v1, v2, v3; SMI-S CLI, Virtual Connect Manager, HPE OneView
Extended management features	Virtual Connect Manager supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass-through, IGMP Snooping, NIC Teaming integrated with Onboard Administrator, HPE Systems Insight Manager, HPE Storage Essentials (FC Management MIB), Telnet, SNMP, FC port telemetry via GUI, telemetry support for port utilization including memory, and CPU performance measurement including FlexNICs telemetry	Virtual Connect Manager supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass-through, IGMP Snooping, NIC Teaming Integrated with Onboard Administrator, HPE Systems Insight Manager, HPE Storage Essentials (FC Management MIB), Telnet, SNMP, FC port telemetry via GUI, Telemetry support for port utilization including memory, and CPU performance measurement including FlexNICs telemetry	Virtual Connect Manager supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass-through, IGMP Snooping, NIC Teaming Integrated with Onboard Administrator, HPE Systems Insight Manager Telnet, SNMP, Telemetry support for port utilization including memory, and CPU performance measurement including FlexNICs telemetry
High-availability features	Link Aggregation protocol automatic, loop protection, Mirrored profile database, Multi-path heartbeat between redundant modules	Link Aggregation protocol automatic, loop protection, Mirrored profile database, Multi-path heartbeat between redundant modules	Link Aggregation protocol automatic, loop protection, Mirrored profile database, Multi-path heartbeat between redundant modules
Security	LDAP, SSL, TACACS+ and Radius, role-based management, and GUI and CLI session timeout	LDAP, SSL, TACACS+ and Radius, role-based management, and GUI and CLI session timeout	LDAP, SSL, TACACS+ and Radius, role-based management, and GUI and CLI session timeout
Diagnostics	Troubleshoot network performance and monitor health in terms of CPU and memory, FlexNIC and LAG stats, mirroring—any uplink port can be used as a dedicated mirrored port from the server port(s)	Troubleshoot network performance and monitor health in terms of CPU and memory, FlexNIC, and LAG stats, mirroring—any uplink port can be used as a dedicated mirrored port from the server port(s)	Troubleshoot network performance and monitor health in terms of CPU and memory, FlexNIC, and LAG stats, mirroring—any uplink port can be used as a dedicated mirrored port from the server port(s)
Maximum per enclosure	6	8	8
Direct attach with FC storage	HPE 3PAR StoreServ 7000 Series	HPE 3PAR StoreServ 7000 Series	N/A
Part number	691367-B21 691367-B22 (TAA)	571956-B21 605865-B21 (dual module with VCEM)	638526-B21 662048-B21 (dual module with VCEM)
Warranty in year(s) (parts/labor/onsite)	1/1/1	1/1/1	1/1/1

Interconnects: Ethernet switches



HPE Networking 6127XLG Ethernet Blade Switch



HPE Networking 6125XLG



HPE Networking 6125G/XG

Blade type	Single bay	Single bay	Single bay
Network connections	16 internal 1/10/20 Gb downlinks; Four external 40 Gb; Eight external 10 Gb; Four internal 10 Gb cross-link; IRF support up to eight devices; 1 management console port	16 internal 1/10 Gb downlinks; Four external 40 Gb; 8 external 10 Gb; 4 internal 10 Gb cross-link; 1 management console port	16 internal 1 Gb downlinks; 4 external RJ45 (1 Gb); Four external SFP/SFP+ (1 Gb/10 Gb/IRF); 1 internal 10 Gb cross-link; 1 management console port
Media types	SFP+ SR/LR/LRM optical; QSFP+	SFP+ SR/LR/LRM optical; QSFP+ SR4	Copper RJ45; SFP SX optical; SFP+ SR/LR/LRM optical
Performance	240 Gb/s uplink port bandwidth; 320 Gb/s downlink (server) port bandwidth; 40 Gb/s cross-link bandwidth; forwarding rate 1.5 million pps per Gigabit port (64-byte packets); 14.8 million pps per 10 Gb port, and 59.3 million pps per 40 Gb port	240 Gb/s uplink port bandwidth; 160 Gb/s downlink (server) port bandwidth; 40 Gb/s cross-link bandwidth; forwarding rate 1.5 million pps per Gigabit port (64-byte packets); 14.8 million pps per 10 Gb port; 59.3 million pps per 40 Gb port	44 Gb/s uplink port bandwidth; 16 Gb/s downlink (server) port bandwidth; 10 Gb/s cross-link bandwidth; forwarding rate 1.5 million pps per Gigabit port; 14.8 million pps per 10 Gb port
Protocol support	SSHv2, TACACS, TACACS+, RADIUS; IEEE 802.3, 802.3ab, 802.1ad, 802.1s, 802.1w, 802.1p, 802.1x, 802.1Qbg (VEPA) 802.3ad (static), 802.1Q, IGMP and 1588 Snooping, BOOTP, FCoE, FCF, TRILL, SPB, VXLAN	SSHv2, TACACS, TACACS+, RADIUS; IEEE 802.3, 802.3ab, 802.1ad, 802.1s, 802.1w, 802.1p, 802.1x, 802.1Qbg (VEPA), 802.3ad (static), 802.1Q, IGMP snooping, and BOOTP, FCoE, FCF, TRILL, SPB	SSHv2, TACACS, TACACS+, RADIUS; IEEE 802.3, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.1x, 802.3ad (static), and 802.1Q, IGMP snooping, BOOTP
Management	CLI, SNMP v1, v2c, and v3; OOBM via OA; GUI management via HPE IMC; RJ45 console port; sFlow and RMON networking monitoring; NTP OAM (802.3ah); CFD (802.1ag); Virtual Application Network (VAN), ISSU; SDN with OpenFlow	CLI, SNMP v1, v2c, and v3; OOBM via OA; GUI management via HPE IMC; RJ45 console port; sFlow and RMON network monitoring; NTP OAM (802.3ah); CFD (802.1ag); SDN with OpenFlow	Web browser or CLI, HTTPS, SNMP v1, v2c, and v3 OOBM via OA; GUI Management via HPE IMC, RJ45 console port, sFlow and RMON network monitoring, NTP OAM (802.3ah); CFD (802.1ag)
High-availability features	IRF, LACP Spanning Tree, ECMP, DLDP, RRPP, Smart Link, VRRP	IRF, LACP, Spanning Tree; ECMP, DLDP, Smart Link; VRRP	IRF; LACP; Spanning Tree; ECMP; DLDP; Smart Link; VRRP
Maximum per c7000 enclosure	8	8	8
Part number	787635-B21 787635-B22 (TAA)	711307-B21 737230-B21 (TAA)	658250-B21 737226-B21 (TAA)
Warranty in year(s) (parts/labor/onsite)	1/1/1	1/1/1	1/1/1



HPE Networking 6125G



Mellanox SX1018 HPE



Cisco Fabric Extender for HPE

Blade type	Single bay	Double bay	Single bay
Network connections	16 internal 1 Gb downlinks; 4 external RJ45 (1 Gb); 4 external SFP/SFP+ (1 Gb/IRF @10 Gb); 1 internal 10 Gb cross-link; 1 management console port	16 internal 10 Gb/40 Gb downlinks; 18 40 Gb QSFP+ uplinks; 1 management console port (double bay width interconnect)	16 internal 1/10 Gb downlinks; 8 external SFP+ 10 Gb uplinks
Media types	Copper RJ45; SFP SX optical	QSFP+	SFP+ SR/LR/optical DAC copper cables; Cisco Fabric Extender Transceivers
Performance	26 Gb/s uplink port bandwidth; 16 Gb/s downlink (server) port bandwidth; 10 Gb/s cross-link port bandwidth; forwarding rate 1.5 million pps per Gigabit port; (64-byte packets); 14.8 million pps per 10 Gb port	1440 Gb/s uplink port bandwidth; 640 Gb/s downlink (server) port bandwidth; 230 ns latency at 40 Gb; 20 ns latency at 10 Gb; 2 Gb main, 2 MB flash memory	48 Gb switching fabric; 128 MB DDR SDRAM; 16 MB flash memory
Protocol support	SSHv2, TACACS, TACACS+, RADIUS; IEEE 802.3, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.1x, 802.3ad (static), and 802.1Q, IGMP snooping, BOOTP	SSHv2, TACACS, TACACS+, RADIUS, IEEE 802.3, 802.3u, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.3ac, 802.1x	IEEE 802.1p: CoS prioritization; 802.1Q, 802.3; 802.3ae, 802.3ap, SFF 8431 SFP+ support, RMON, SFF 8461
Management	Web browser or CLI, HTTPS; SNMP v1, v2c, and v3; OOBM via OA; GUI Management via IMC; RJ45 console port; sFlow and RMON network monitoring; NTP; OAM (802.3ah); CFD (802.1ag)	Web browser or CLI, HTTPS; GUI management via UFM; SNMP v1, v2c and v3; OOBM via OA; IGMPv1, IGMPv2; NTP; RADIUS/TACACS+; LLDP Discovery protocol, sFlow, OpenFlow	Fabric extender management using in-band management; Cisco DCNM and standard SNMP, XML interfaces, and CLI
High-availability features	IRF; LACP; Spanning Tree; ECMP; DLDP; Smart Link; VRRP	RSTP; MSTP; Link Aggregation Control Protocol	Uplink traffic management through Cisco Ether Channel hashing or static port pinning
Maximum per c7000 enclosure	8	2	8
Part number	658247-B21 737220-B21 (TAA)	689638-B21	641146-B21 657787-B21
Warranty in year(s) (parts/labor/onsite)	1/1/1	1/1/1	1/1/1

Ethernet Adapters for HPE BladeSystem c-Class



HPE FlexFabric 10 Gb 2-port 534M Adapter



HPE FlexFabric 10 Gb 2-port 534FLB Adapter



HPE Flex-10 10 Gb 2-port 552M Adapter



HPE Flex-10 10 Gb 2-port 530M Adapter



HPE Flex-10 10 Gb 2-port 530FLB Adapter



HPE Ethernet 1 Gb 2-port 361FLB Adapter

Hardware features

Server type	(Gen8/Gen9)	(Gen8)	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)
IEEE compliance	802.3, 802.1ab, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, 802.1au, 802.3ap, 802.1as, 802.1qaz, 802.1Qbb, IEEE 1588	802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x, IEEE 1588, 802.1AS	IEEE 802.1p, 802.1q, 802.1qau, 802.3ad, 802.3ae, 802.3ap (10GBASE-KX4), and 802.3x	IEEE 802.3, 802.3ab, 802.3u, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, and 802.3ap	IEEE 802.3, 802.1ab, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, 802.1au, and 802.3ap	802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x, IEEE 1588, 802.1AS
Ports/type	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 1 Gb
Form factor	x8 PCIe, type I card	FlexibleLOM	x8 PCIe 2.0, type A card	x8 PCIe 2.0, type A card	x8 PCIe 2.0 FlexibleLOM	FlexibleLOM
Network controller	QLogic 57810S	QLogic 57810S	Emulex BE3	QLogic 57810S	QLogic 57810S	Intel i350
Software features						
Adapter teaming	Yes	Yes	Yes	Yes	Yes	Yes
PXE	Yes	Yes	Yes	Yes	Yes	Yes
TOE, accelerated iSCSI, and iSCSI boot	TOE, accelerated iSCSI, and iSCSI boot	TOE, accelerated iSCSI, and iSCSI boot	TOE	TOE	TOE	-
Warranty in year(s) (parts/labor/onsite)	1/0/0	1/0/0	1/0/0	1/0/0	1/0/0	1/0/0



HPE NC553m 10 Gb 2-port FlexFabric Adapter



HPE NC532m 2-port Flex-10 10Gb Adapter



HPE Ethernet 1 Gb 4-port 366M Adapter



HPE NC364m Quad-Port 1GbE Adapter



HPE NC360m Quad-Port 1GbE Adapter

Hardware features

Server type	Blade	Blade	Blade (Gen8)	Blade	Blade
IEEE compliance	IEEE 802.1p, 802.1q, 802.1qau, 802.3u, 802.3ad, 802.3ae, 802.3ap (10GBASE-KX4), 802.3x, and 802.3z	IEEE 802.3u, 802.3x, 802.3ad, 802.1p, 802.1q, 802.3z, 802.3ae, and 802.3ap (10GBASE-KX4)	802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x, IEEE 1588, 802.1AS	IEEE 802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x	IEEE 802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x
Ports/type	2 x 10 Gb	2 x 10 Gb	4 x 1 Gb	4 x 1 Gb	4 x 1 Gb
Form factor	x8 PCIe 2.0, type I card	x8 PCIe 2.0, type I card	x4 PCIe, type I card	x4 PCIe, type I card	x4 PCIe, type I card
Network controller	Emulex BE3	Broadcom 57711	Intel i350	Dual Intel 82571EB	Intel 82571EB
Software features					
Adapter teaming	-	Yes	Yes	PXE boot with VC modules only	PXE boot with VC modules only
PXE	-	Yes	Yes	Yes (Windows)	Yes (Windows)
TOE, accelerated iSCSI, and iSCSI boot	TOE, accelerated iSCSI, iSCSI boot	TOE, accelerated iSCSI	-	-	-
Warranty in year(s) (parts/labor/onsite)	1/0/0	1/0/0	1/0/0	1/0/0	1/0/0

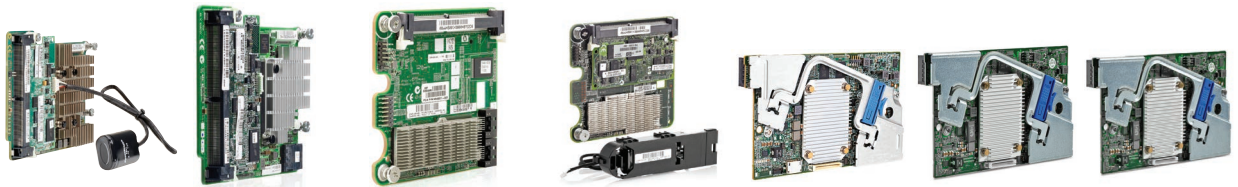
Interconnects: Direct Connect SAS Switch



HPE 6 Gb SAS Switch for HPE BladeSystem c-Class

Performance	6 Gb/s SAS
Port configuration	16 internal (2x) SAS ports, 8 external (4x) SAS ports
Management features	Virtual SAS Manager (VSM) GUI and CLI allows port based and bay based configuration
High-availability features	Redundant switches; hot-pluggable; non-disruptive software upgrades, dual domain support
Protocols supported	SAS
Warranty in year(s)⁸ (parts/labor/onsite)	1/1/1
HPE related offerings	HPE Direct Connect SAS Controllers
Capacity for server blades	External SAS JBOD (D6000) SAS storage: Each BladeSystem enclosure supports up to four HPE MSA P2000 G3 storage arrays

HPE Smart Array Controllers



HPE Smart Array P731m/P741m Controllers

HPE Smart Array P721m Controller

HPE Smart Array P712m Controller

HPE Smart Array P711m Controller

HPE Smart Array P246br HBA

HPE Smart Array H244br HBA

HPE Smart Array P244br HBA

	HPE Smart Array P731m/P741m Controllers	HPE Smart Array P721m Controller	HPE Smart Array P712m Controller	HPE Smart Array P711m Controller	HPE Smart Array P246br HBA	HPE Smart Array H244br HBA	HPE Smart Array P244br HBA
Performance	6 Gb/s SAS with 2 Gb FBWC (P731m) 12 Gb/s SAS with 4 Gb FBWC (P741m)	6 Gb/s SAS includes either a 512 MB or 2 GB FBWC	6 Gb/s SAS available 256 MB cache	6 Gb/s SAS includes 1 GB FBWC	12 Gb/s SAS with 1 Gb FBWC	12 Gb/s SAS with zero memory	HPE Smart Array P244br HBA
Port configuration	4 external (2x) SAS ports	4 external (2x) SAS ports	2 internal (1x) SAS ports, 2 external (2x) SAS ports (only enabled with cache)	4 external (2x) SAS ports	4 internal SAS ports	2 internal SAS ports	2 internal SAS ports
Management features	Online array expansion, RAID migration, and online spares Virtual SAS Manager	Online array expansion, RAID migration, and online spares Virtual SAS Manager	Online array expansion, RAID migration, and online spares (with cache) Virtual SAS Manager	Online array expansion, RAID migration, and online spares Virtual SAS Manager	HPE SSA Smart Array management with online array expansion, RAID migration	HPE SSA Smart HBA management	HPE SSA Smart Array management with online array expansion, RAID migration
High-availability features	Flash backed write cache, RAID 0, 1, 10, 5, 50, 6, 60, 1 ADM, 10 ADM	Flash backed write cache, RAID 0, 1, 10, 5, 50, 6, 60, 1 ADM, 10 ADM	RAID 0, 1, 10, 5, and 50 (on shared storage)	Flash backed write cache, RAID 0, 1, 5, 6, 50, and 60	Raid mode or HBA mode, flash backed write cache (FBWC), RAID 0, 1	RAID mode or HBA mode	RAID mode or HBA mode, flash backed write cache (FBWC), RAID 0 or 1
Protocols supported	3/6 Gb/s SAS, 3/6 Gb/s SATA	3/6 Gb/s SAS, 3/6 Gb/s SATA	6 Gb/s SAS, 3 Gb/s SATA	3/6 Gb/s SAS, 1.5/3 Gb/s SATA	Up to 12 Gb/s SAS or 6 Gb/s SATA	Up to 12 Gb/s SAS or SATA	Up to 12 Gb/s SAS or SATA
Warranty in year(s)⁹ (parts/labor/onsite)	3/0/0	3/0/0	3/0/0	3/0/0	3/0/0	3/0/0	3/0/0

⁸, ⁹ Or the warranty of the server that holds the adapter, whichever is greater.

Interconnects: InfiniBand Switch Module



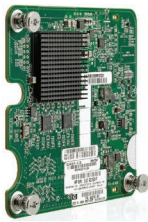
HPE BLc 4X QDR IB Switch



HPE BLc 4X DDR IB G2 Switch

Performance	40 Gb/s (QDR) per port, 2.5 Tb/s switching capacity	20 Gb/s (DDR) per port, 1.28 Tb/s switching capacity
Port configuration	16 4X QDR QSFP uplink ports	16 4X DDR QSFP uplink ports
Management features	Externally managed	Externally managed
Support notes	Requires subnet manager on the fabric. Supported only on new RoSH 6 of 6 compliant c7000 enclosure	Requires subnet manager on the fabric
Protocols supported	IBTA	IBTA
Warranty¹⁰	1-year parts exchange	1-year parts exchange

Interconnects: InfiniBand Mezzanine HCA



HPE 4X QDR IB Dual-Port Mezzanine HCA



HPE 4X DDR IB Dual-Port Mezzanine HCA

Performance	4x quad data rate (40 Gb/s)	4x double data rate (20 Gb/s)
Port configuration	Dual-port	Dual-port
Management features	OFED driver stack	OFED driver stack
Supported ProLiant BL	BL280c G6, BL460c G6, and BL490c G6	BL260c G5, BL280c G6, BL2x220c G5, BL460c, BL460c G5, BL460c G6, BL465c G5, BL480c, BL490c G6, BL495c G5, BL680c G5, BL685c, BL685c G5, and BL685c G6
Supported Integrity BL	N/A	BL860c
Warranty¹¹	1-year parts exchange	1-year parts exchange

¹⁰, ¹¹ Or the warranty of the server that holds the adapter, whichever is greater.

Step 4: Choose your server blades

HPE ProLiant servers, the world's most intelligent servers, are faster, smarter, and more efficient so businesses can embrace the New Style of IT. With the broad portfolio, HPE server blades deliver the right compute, for the right workload, at the right time.



HPE ProLiant BL460c Gen9

The world's most popular server blade delivers the ideal balance of performance, scalability, and expendability, making it the standard for dense data center computing.

Number of processors	1 or 2
Maximum number of cores per blade	44
Processor family	Intel® Xeon® E5-2600 v4 or v3
Maximum processor frequency	3.5 GHz
Memory slots	16
Maximum memory per server	2 TB ¹²
Networking ports (embedded)	None
Maximum FlexibleLOM ports	2
Maximum drive bays	2 SFF SATA/SAS/SSD, NVMe
Maximum internal storage	7.68 TB
I/O expansion slots	2 PCIe 3.0 mezzanine
Form factor	Half-height server blade 16 per 10U enclosure 8 per 6U enclosure
UEFI support	Yes
Management	HPE iLO 4 HPE OneView HPE Insight Online
Warranty in year(s)¹³ (parts/labor/onsite)	3/3/3

Server blade options, including memory DIMMs and hard drives, are available on select models. For more information, visit hpe.com/info/qualifiedoptions or hpe.com/servers/integrityblades.

Applications and virtual machines

The number of applications, virtual machines, and users supported by your solution will determine the number of server blades you need. Together with our channel partners, we can help you choose the right number of blades with our solution-sizing tools and expertise.

In addition, ActiveAnswers is an online resource with a variety of solutions to help you make the right choice. Learn more about ActiveAnswers or find simple solution help at hpe.com/info/cdlibrary.

¹² With 128 GB DIMMs, available in summer 2016.

¹³ Or the warranty of the server that holds the adapter, whichever is greater.



HPE ProLiant BL660c Gen9

The ideal four-socket dense form factor without compromising on performance, scalability, and expandability.

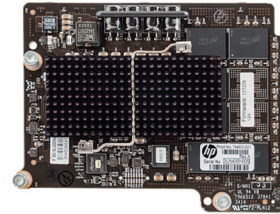
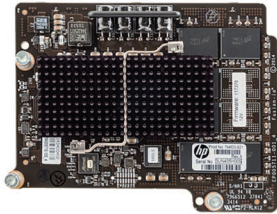
Number of processors	2 or 4
Maximum number of cores per blade	88
Processor family	Intel Xeon E5-4600 v4 or v3
Maximum processor frequency	3.2 GHz
Memory slots	32
Maximum memory per server	4.0 TB ¹⁴
Networking ports (embedded)	None
Maximum FlexibleLOM ports	4
Maximum drive bays	4 SFF SATA/SAS/SSD/NVMe
Maximum internal storage	7.68 TB
I/O expansion slots	3 PCIe 3.0 mezzanine
Form factor	Full-height server blade 8 per 10U enclosure 4 per 6U enclosure
UEFI support	
Management	HPE iLO 4 HPE OneView HPE Insight Online
Warranty in year(s)¹⁵ (parts/labor/onsite)	3/3/3
HPE related offerings	
Support services¹⁶	HPE 3-year 4-hour 24x7 Proactive Care Service and HPE Startup BladeSystem or HPE Install c-Class Server Blade Service
Storage	Choose from a complete portfolio of internal and external storage
Infrastructure management	HPE OneView delivers automated lifecycle management from a single, integrated platform. Matrix Operating Environment for advanced infrastructure management across ProLiant blades. Refer to the product documentation for the latest product support.

Server blade options, including memory DIMMs and hard drives, are available on select models. For more information, visit hpe.com/info/qualifiedoptions or hpe.com/servers/integrityblades.

¹⁴ With 128 GB DIMMs, available in summer 2016.

¹⁵ Or the warranty of the server that holds the adapter, whichever is greater.

¹⁶ All blades within a single HPE BladeSystem enclosure must be at the same service level.



HPE 1.6TB Read Intensive Mezzanine PCIe Workload Accelerator for BladeSystem c-Class

HPE 1.2TB Read Intensive Mezzanine PCIe Workload Accelerator for BladeSystem c-Class

Usable capacity	1.6 TB	1.2 TB
Max Sequential Throughput	Reads 2,400 MiB/s, Writes 1,500 MiB/s	Reads 2,200 MiB/s, Writes 1,300 MiB/s
Access Latency (4KiB, Q1)	Reads 117 microseconds, Writes 27 microseconds	Reads 115 microseconds, Writes 28 microseconds
IOPS (4KiB, Q16)	Read 83,000 IOPS, Write 83,000 IOPS	Read 81,000 IOPS, Write 83,000 IOPS
Form factor	Mezzanine	Mezzanine
PCI Express	PCI Express 2.0 x 8	PCI Express 2.0 x 8
Warranty	3/0/0	3/0/0

“How do we enable anywhere, anytime application and information delivery, while also ensuring the protection of corporate information and minimizing management?”

For many companies, the answer is to virtualize the desktop environment and deploy a flexible work style strategy with initiatives such as Bring Your Own Device (BYOD). BYOD enables workers to use their own smartphone, tablet, or laptop for business purposes, but with important improvements: device management and application delivery take place in the data center, not on the end-point device. This approach offers many advantages:

- Increased worker productivity and empowerment
- Lower desktop costs
- Company information remains secure behind the corporate firewall, even when an end-user device is lost or stolen

HPE client virtualization solutions

Today’s workforce is global and mobile. Workers have new expectations for data and application delivery. They want seamless collaboration, eLearning, and unified communications (i.e., instant messaging and video conferencing) capabilities. They demand support for next-generation applications that can transform the way they work. And they want the ability to work from any location, at any time, using any device.

While this new work paradigm has distinct advantages—with increased productivity topping the list—it also presents new challenges. For example, managing a large distributed workforce is complex and time consuming. Security breaches are also a major concern, regardless of the end-point device being used.

Hewlett Packard Enterprise delivers both enterprise and small/midsize business (SMB) reference architectures integrated with Citrix®, Microsoft, and VMware software that explain how to:

- Provide secure access to applications and desktops by supporting hosted-shared, VDI desktops and application virtualization, while also optimizing the efficiency of the IT infrastructure.
- Improve efficiency using a single, common, modular, standards-based platform like HPE BladeSystem to support all types of workloads, from task workers to workstation-class graphics users.
- Speed the deployment of client virtualization solutions, enhance the worker experience, and boost productivity.

Learn more about HPE client virtualization solutions at hpe.com/info/cv.

HPE ProLiant WS460c Gen9 Graphics Server Blades



HPE ProLiant WS460c Gen9 Graphics Server Blade



HPE ProLiant WS460c Gen9 Graphics Server Blade with Expansion

New generation of high-density workstation-class compute power with data center-class security and scalability. And now with support for multiple media-rich PC users per blade with NVIDIA® GRID graphics cards.

Number of processors	1 or 2	1 or 2
Maximum number of cores	44	44
Processor family	Intel Xeon E5-2600 v4 or v3	Intel Xeon E5-2600 v4 or v3
Maximum processor frequency	3.5 GHz	3.5 GHz
Memory slots	16	16
Maximum memory per server	1 TB	1 TB
Maximum FlexibleLOM ports	2	2
Maximum drive bays	2 SFF SATA/SAS/SSD	2 SFF SATA/SAS/SSD
Maximum internal storage	7.68 TB	7.68 TB
I/O expansion slots	2 PCIe x16 (Gen3) mezzanine slots	2 full-size, full-height, PCIe x16 (Gen3) slots
Graphics	1 NVIDIA Quadro K3100M or 1 NVIDIA Tesla M6 or 1 AMD S7100X	HPE MultiGPU Carrier (4 NVIDIA Tesla M6) or (4 AMD S7100X) or (6 NVIDIA Quadro K3100M) or 1 NVIDIA GRID K2/K1 or 1 NVIDIA Quadro K6000/K5000 or up to 2 NVIDIA Quadro K4000
Form factor	Half-height server blade, 16 per 10U enclosure, 8 per 6U enclosure	Half-height, double-width server blade, 8 per 10U enclosure, 4 per 6U enclosure
Warranty in year(s) (parts/labor/onsite)	3/3/3	3/3/3

Note: Photo shown with optional NVIDIA Quadro graphics installed.

Mezzanine graphics



NVIDIA Quadro K3100M mezzanine graphics card



NVIDIA Tesla M6 mezzanine graphics adapter



AMD S7100X mezzanine graphics card

Mezzanine slot	MXM3 type-B mezzanine, single card	MXM3 type-B mezzanine, single card	MXM3 type-B mezzanine, single card
GPU cores	NVIDIA CUDA, 768	NVIDIA CUDA, 1536	GFXIP8, 2048
Memory size	4 GB (GDDR5)	8 GB (GDDR5)	8 GB (GDDR5)
PCI Express	x16 Gen3	x16 Gen3	x16 Gen3

Graphics for Expansion Blade



HPE MultiGPU Carrier
(shown with six NVIDIA Quadro K3100M) (two carriers)

HPE MultiGPU carrier with NVIDIA M6 (two per carrier)

HPE MultiGPU carrier with AMD S7100X (two per carrier)

NVIDIA GRID K2

NVIDIA GRID K1

	HPE MultiGPU Carrier (shown with six NVIDIA Quadro K3100M) (two carriers)	HPE MultiGPU carrier with NVIDIA M6 (two per carrier)	HPE MultiGPU carrier with AMD S7100X (two per carrier)	NVIDIA GRID K2	NVIDIA GRID K1
PCIe form factor	Single-width, dual cards	Single-width	Single-width	Double-width, single card only	Double-width, single card only
GPU cores	240 per GPU	768 per GPU	2048 per GPU	3072 (2 GPUs)	768
Memory size	2 GB (GDDR5) per GPU	8 GB per GPU	8 GB per GPU	8 GB (GDDR5)	16 GB (GDDR3)
PCI Express	PCIe x16 (Gen3)	PCIe x16 (Gen3)	PCIe x16 (Gen3)	PCIe x16 (Gen3)	PCIe x16 (Gen3)



NVIDIA Quadro K6000

NVIDIA Quadro K5000

NVIDIA Quadro K4000

NVIDIA Quadro M6000

NVIDIA Quadro M5000

	NVIDIA Quadro K6000	NVIDIA Quadro K5000	NVIDIA Quadro K4000	NVIDIA Quadro M6000	NVIDIA Quadro M5000
PCIe form factor	Double-width, single card only	Double-width, single card only	Single-width, dual cards	Double-width, single card only	Double-width, single card only
NVIDIA CUDA cores	2,880	1536	768	3,072	2,048
Memory size	6 GB (GDDR5)	4 GB (GDDR5)	3 GB (GDDR5)	12 GB (GDDR5)	8 GB (GDDR5)
PCI express	PCIe x16 (Gen3)	PCIe x16 (Gen2)	PCIe x16 (Gen2)	PCIe x16 (Gen3)	PCIe x16 (Gen3)

HPE BladeSystem is one of the most affordable ways to connect servers to your Fibre Channel-based SAN. The BladeSystem architecture reduces cables and transceivers and can help you save up to 64 percent¹⁷ compared to traditional rack-mount environments. For more information on SAN options from HPE, visit hpe.com/storage.

Step 5: Choose your storage infrastructure

Connect to external HPE SAN, NAS, and backup solutions, or put storage solutions inside the BladeSystem enclosure, side by side with your server blades, to quickly add storage expansion and data protection—without adding a single cable.

HPE BladeSystem storage options

In addition to internal storage blades supported by HPE BladeSystem, you can also choose to connect to any member of the HPE Converged Storage portfolio. This portfolio spans from entry-level options to multi-petabyte, all-flash arrays that deliver millions of IOPS and sub-millisecond latencies. Built on modular, industry-standard hardware, scale-out federated software, and integrated management, HPE Converged Storage delivers the simplicity, efficiency, and agility you need to support virtualization, the cloud, and IT as a Service (ITaaS).

In addition to storage blade, your converged storage options include both systems-based, service level-optimized storage such as HPE 3PAR StoreServ Storage arrays and HPE StoreOnce System backup appliances, as well as cost-optimized virtual storage appliances (VSAs) for those looking to add data services using a software-defined storage approach.

Add further efficiency and IT agility with streamlined storage and networking solutions. Many HPE 3PAR StoreServ Storage systems, including all-flash and converged flash arrays, can be directly connected to HPE Virtual Connect FlexFabric modules with HPE's Flat SAN direct-attach technology to help reduce infrastructure and simplify your storage solution.

¹⁷ Windows and Linux-managed nodes.

HPE BladeSystem Storage options (internal)



HPE D2220sb Storage Blade*

Delivers direct-attach storage for the adjacent Gen8 server blade, and shared iSCSI storage with StoreVirtual VSA software.



HPE StoreEasy 3850 Gateway Blade Storage

A new breed of efficient, secure, and highly available NAS gateways to easily address the file and application storage for SANs.

Interconnect	Direct-attach over PCIe (iSCSI SAN storage when configured with HPE StoreVirtual VSA on server blade)	SAN connect: SMB (CIFS), NFS, FTP and FTPS, HTTP and HTTPS, WebDAV, iSCSI
Drives supported	Up to 12 SFF SAS, SATA, SAS/SATA SSD drives	Enterprise SAS HDDs for internal OS drives only
Maximum capacity	Up to 24 TB raw SAS Up to 24 TB raw SATA	Gateway to unlimited external storage (0 GB useable; internal drive capacity for OS mirror only)
Form factor	Half-height storage blade	Half-height storage blade
RAID levels supported	RAID 0, 1, 10, 5, and 6	OS drives configured with RAID 0, 1
Warranty¹⁸	Hardware—3-year NBD Parts Only Software—3-year 9x5 remote technical support	3-year parts exchange, 3-year labor, 3-year onsite, and next business day response for hardware; 1-year 24x7 telephone support for software
HPE related offerings		
Support services¹⁹	Installation and Startup for HPE BladeSystem Infrastructure and 3-year, 24x7 hardware support	3-year, Support Plus 24 and enhanced 3-year, Proactive 24 service

* Supports Gen8 blade servers as well as BL460c and BL660c Gen9



HPE IO Accelerator G2 for HPE BladeSystem c-Class

Ideal for organizations faced with increasing demands for better application performance from their technology infrastructure.

Capacity	365 GB, 785 GB, 1.2 TB native maximum, depending on model
ProLiant server blade supported	Gen8
Maximum IOPS	530,000 IOPS
Supported operating systems	Microsoft Windows Server® 2008 (x86_64-bit only) R1 with SP2 or higher, Microsoft Windows Server 2008 (x86_64-bit only) R2, Microsoft Windows Hyper-V, Red Hat Enterprise Linux 5.7 (AMD64/EM64T), Red Hat Enterprise Linux 6.1 (AMD64/EM64T), SUSE Linux Enterprise Server 10 (AMD64/EM64T), SUSE Linux Enterprise Server 11 (AMD64/EM64T), VMware ESX 4.1, VMware ESXi 5.x
Warranty²⁰	3-year parts only

¹⁸ Or the warranty of the server that holds the adapter, whichever is greater.

¹⁹ All blades within a single HPE BladeSystem enclosure must be at the same service level.

²⁰ Or the warranty of the server that holds the adapter, whichever is greater.

HPE BladeSystem Storage options (software-defined)



HPE StoreVirtual Virtual Storage Appliance (VSA)

This affordable, software-defined storage solution provides you with flexible deployment choices to reduce complexity and cost by co-locating virtualized applications and shared storage.



HPE StoreOnce Virtual Storage Appliance (VSA)

Extends the deployment options for HPE StoreOnce System with the agility and flexibility of a virtual appliance, removing the need to install dedicated hardware. This provides a flexible and a cost-effective backup target for virtualized server environments.

Hardware support	Runs on all HPE ProLiant or third-party servers and c-Class server blades certified with VMware vSphere, Microsoft Hyper-V, or KVM	Runs on all HPE ProLiant or third-party servers and c-Class server blades certified with VMware ESXi, Microsoft Hyper-V, or Ubuntu KVM
Warranty standard statement	3-year or 5-year HPE software support standard; 9x5 business hours phone support (software technical support and software product and documentation updates)	3-year or 5-year HPE software support standard; 9x5 business hours phone support (software technical support and software product and documentation updates)
Software licensing terms	License keys enable all features of the HPE StoreVirtual VSA, including storage clustering, application-managed snapshots and Remote Copy. Keys are required for each individual VSA instance. Licenses available for up to 4 TB, 10 TB, or 50 TB usable capacity.	The StoreOnce VSA has an all-inclusive license which includes the StoreOnce Catalyst, Replication and Security Pack features and entitlement to HPE technical support. Licenses available for up to 4 TB, 10 TB, or 50 TB usable capacity. Capacity upgrade licenses are available.
Download location	Free 1 TB license available at: hp.com/us/en/products/data-storage/server-vsa.html	Free 1 TB license available at: hp.com/go/freebackup
HPE related offerings		
Support services	HPE StoreVirtual VSA Software Installation and Startup Service HPE Proactive Select Services HPE Proactive Care 24x7 HPE Proactive Care Personalized Support	HPE StoreOnce VSA Software Installation and Startup Service HPE Proactive Select Services HPE Proactive Care 24x7 HPE Proactive Care Personalized Support

HPE BladeSystem Storage options (external)



HPE 3PAR StoreServ 8200 or 8400 Storage

When value matters most. These models feature a flash-focused design but also support spinning media.



HPE 3PAR StoreServ 8440 or 20800 Storage

When scale matters most. These models feature a flash-focused design but also support spinning media for industry-leading scalability.



All-Flash HPE 3PAR StoreServ 8450, 20450, or 20850 Storage

All-flash arrays for when performance matters most, including up to 3.2 million IOPS at sub-millisecond latency.



Interconnect	16 Gb/s FC host ports; Optional 10 Gb/s iSCSI, 10 Gb/s FCoE, and 10/16 Gb/s Ethernet ports. Two built-in remote copy ports per node pair. Maximum initiators per system: 2048 or 4096	16 Gb/s FC host ports; Optional 10 Gb/s iSCSI, 10 Gb/s FCoE, and 10/16 Gb/s Ethernet ports. Two built-in remote copy ports per node pair.	16 Gb/s FC host ports; Optional 10Gb/s iSCSI, 10 Gb/s FCoE, and 10/16 Gb/s Ethernet ports. Two built-in remote copy ports per node pair.
Drives supported	6-576 HDDs (SAS or NL) 6-240 SSDs (MLC or cMLC)	6-1920 HDDs (SAS or NL) 6-1044 SSDs (MLC or cMLC)	6-1024 SSDs (MLC or cMLC)
Maximum capacity	Up to 2400 TB	Up to 6000 TB	Up to 3932 TB
RAID levels supported	RAID 0, 1, 5, and 6	RAID 0, 1, 5, and 6	RAID 0, 1, 5, and 6
Warranty in year(s)²¹ (parts/labor/onsite)	3/3/3 5 years for all SSDs	3/3/3 5 years for all SSDs	3/3/3 5 years for all SSDs
HPE related offerings			
Support services²²	Installation and Startup service, HPE Proactive Care 24x7; HPE Proactive Care Advanced; HPE Proactive Care Select; For a full list see: hpe.com/services/storage	Installation and Startup service, HPE Proactive Care 24x7; HPE Proactive Care Advanced; HPE Proactive Care Select; For a full list see: hpe.com/services/storage	Installation and Startup service, HPE Proactive Care 24x7; HPE Proactive Care Advanced; HPE Proactive Care Select; For a full list see: hpe.com/services/storage

²¹ Or the warranty of the server that holds the adapter, whichever is greater.

²² All blades within a single HPE BladeSystem enclosure must be at the same service level.

HPE BladeSystem Storage options (external) (continued)



HPE MSA Storage

Storage consolidation for small to mid-sized companies and remote locations



HPE StoreVirtual 4000 Storage

Highly available storage for virtual server environments



HPE D6000 Disk Enclosure

High-density, cost-effective storage for BladeSystem

Interconnect	8/16 Gb Fibre Channel and/or 1/10GbE iSCSI (2-4 ports per controller)	For each StoreVirtual Node: 4 (four) 1 Gb iSCSI ports; 2 (two) 10 Gb iSCSI ports in select models	6 Gb SAS
Drives supported	99-199 SFF drives or 48-96 LFF drives maximum including expansion	48 TB per node with 32 nodes maximum scalability	Up to 70 LFF drives per enclosure
Maximum capacity	768 TB maximum with expansion, depending on drive type	1536 TB	Up to 560 TB supported in a single box
RAID levels supported	RAID 0, 1, 3, 5, 6, 10, and 50	RAID 1 0, 5, and 6. Network RAID 10 eliminates any single point of failure 10 and 50	RAID functionality provided by supported by provided HPE Smart Array controllers
Warranty in year(s)²³ (parts/labor/onsite)	3/0/0	3/3/3	3/0/0
HPE related offerings			
Support services²⁴	HPE Proactive Care 24x7; HPE Proactive Care Advanced; HPE Proactive Care Personalized Support; HPE Foundation Care 24x7 Service	Installation and Startup Service HPE Proactive Care 24x7	Installation and Startup Service HPE Foundation Care 24x7 Service HPE Proactive Care 24x7



HPE StoreOnce System

Disk-based data protection for IT environments, from virtualized environments to large data centers.



HPE StoreEver Tape Automation

Tape autoloaders and libraries for efficient, unattended, cost-effective backups or archive.



HPE Data Protector Software

HPE backup and recovery software for complete protection across the entire enterprise infrastructure.

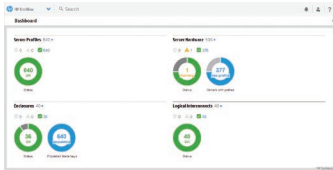
Interconnect	10GbE and 8 Gb FC, 1 Gb Ethernet, and 1GbE, 10GbE vNIC, iSCSI available. (Host interface and number of ports per controller depending on the model)	4 Gb Fibre Channel, 8 Gb Fibre Channel, 6 Gb SAS
Capacity	Scalable from 1 TB to 2240 TB raw or 1 TB to 1728 TB (usable, depending the model)	Up to 6.25 TB per LTO-6 cartridge (assuming 2.5:1 compression) options from 8 to 560 slots
Transfer rate	Up to 139 TB/hr (max), depending on the model	Up to 1.44 TB/hr per drive Max: 60.4 TB/hr with 42 LTO-6 tape drives
Format	N/A	N/A
Media compatibility/RAID levels supported	Hardware RAID 6 (RAID 5 with StoreOnce 2700 only)	LTO-6; LTO-5; LTO-4
Form factor	Rack-based (19-inch rack)	Rack-based external data protection
Warranty in year(s)²⁵ (parts/labor/onsite)	1/1/1, next-day response with 9x5 phone support	1/1/1, next-day response with 9x5 phone support
HPE related offerings		
Support services	3-year, Proactive Care 24x7	3-year, 24x7 hardware support HPE 3-year 4-hour 24x7 Proactive Care Service

²³, ²⁴ Or the warranty of the server that holds the adapter, whichever is greater.

²⁵ All blades within a single HPE BladeSystem enclosure must be at the same service level.

For more information on SAN options from HPE, visit hpe.com/storage.

HPE Smart Update solution: HPE Service Pack for ProLiant (SPP) and HPE Smart Update Manager (HPE SUM) provide breakthrough system maintenance tools that systematically update HPE ProLiant servers and blade infrastructures.



HPE infrastructure management is delivered through a complete portfolio of HPE ProLiant server lifecycle management capabilities that can flexibly operate from embedded on-system utilities, on premises for software defined data centers, and now even from the cloud. Managing HPE ProLiant Servers with HPE infrastructure management results in increased efficiency and precise control of your server infrastructure resources. With a rich set of capabilities that are easy to access and simple to use, HPE infrastructure management covers critical areas such as server deployment and configuration, health and alerting, energy, power and remote management, automated support, and warranty and contract status and control via a cloud-based portal. The core components that make up HPE infrastructure management are HPE OneView, HPE iLO, and HPE Insight Online. With HPE infrastructure management's built-in automation.

To learn more, visit hpe.com/info/oneview

Step 6: Choose your infrastructure management

Eliminating infrastructure complexity with automation simplicity.

Software-defined infrastructure management designed for the way you work and think

HPE OneView is a fresh approach to converged infrastructure management, with a single integrated view of your IT infrastructure. By shifting the focus from “how devices run” to “how people work,” HPE OneView architecture delivers unprecedented ease of use that lets you deploy and manage your infrastructure faster, at a lower cost, accelerating time to business value.

Transform the way you manage your IT infrastructure—today

You can use HPE OneView to automate the deployment, update and ongoing management of HPE BladeSystem. The HPE OneView dashboard provides an easy-to-understand summary/status of servers, storage pools and enclosures. Color-coded icons tell you which systems are functioning properly and which ones need help—whether you manage five systems or 500. The HPE OneView intuitive dashboard provides an at-a-glance view of configuration compliance making it easy to enforce consistent configurations across server profiles.

- One platform manages HPE BladeSystem and HPE 3PAR StoreServ storage.
- Smart Search instantly finds what you are looking for, without forcing you to search through long and complicated tree views.
- 3-D Power/Thermal Mapping provides intuitive power management.

Software-defined infrastructure management

Based on software-defined management, HPE OneView automates time consuming tasks of lifecycle management with open standards based, easy-to-use, repeatable templates that capture the best-practice configuration of your virtualized infrastructure across compute, storage and fabric, so you can make error-free changes once, then replicate them across your infrastructure fast and easily. Using such templates, you can define firmware baselines, bios configurations, compute, storage and fabric once and then provision the configuration many times—consistently and reliably with no manual repetitive tasks.

You can then manage your infrastructure as pools of resources optimized to the workloads you are running. Streamline and automate your administrative and operational tasks to significantly increase productivity. Roll out new technologies and applications faster, and lower the costs associated with downtime and regulatory risks.

Automated platform

HPE OneView automation hub accelerates deployment and lifecycle management of HPE infrastructure. You can automate deployment of multiple enclosures, blades, storage, and networking programmatically—using the industry-standard REST API or your choice of PowerShell and Python language bindings. With HPE OneView automation capabilities, you can:

- Automate the process of making configuration changes with server profile templates. Profile templates used in combination with HPE Software Update Tools enables online and staged update of drivers and firmware.
- Inform multiple management tools or systems administrators of changes to the infrastructure managed by HPE OneView.
- Quickly react to environmental changes by deploying or updating resources, updating asset management records, or automatically creating service tickets.
- Enable virtualization administrators to automate control of HPE resources—with no detailed knowledge of each device—via the easy integration with third-party management tools such as Chef, VMware vCenter and Microsoft System Center.

HPE OneView delivers a completely new level of storage automation with full integration of HPE 3PAR StoreServ Storage in the HPE OneView Server Profiles for automated, policy-driven rollout of enterprise class storage resources.

HPE Virtual Connect continues to play an integral role in the success of HPE OneView. HPE Virtual Connect simplifies and converges your server edge connections, making server changes transparent to storage and networks, and delivers 4X the number of connections per physical network link. These features are added to provide Virtual Connect feature parity to HPE OneView.

HPE Insight Online is a cloud-based infrastructure management and support portal available through the HPE Support Center and powered by HPE remote support technology so you can work smarter and stay informed and in control of your IT infrastructure. HPE Insight Online provides a personalized dashboard for simplified tracking of IT operations and support information from anywhere, at any time. You can use the Insight Online dashboard to track service events and support cases, view device configurations, and proactively monitor your HPE contracts, warranties, and HPE Proactive service credit balances. HPE Insight Online is designed for IT staff who deploy, manage, and support systems, as well as for HPE Authorized Partners who support your IT Infrastructure. Using the online dashboard saves time, reduces complexity, and helps ensure uptime.

After connecting to HPE and registering with Insight Online, take advantage of HPE Proactive Care service to assist in proactively supporting your IT infrastructure, providing quick access to support experts, and preventing problems before they occur.

HPE iLO is a complete set of embedded management products supporting the lifecycle of the server—from initial deployment through ongoing management and service alerting and support. The HPE iLO ecosystem includes Intelligent Provisioning, Active Health System, Agentless Management, and HPE embedded remote support. By delivering comprehensive embedded management, HPE helps you speed time-to-deployment, maximize server and application availability through proactive notification, and dramatically accelerate time-to-resolution when issues arise. Other embedded management and system utility products not part of the iLO management ecosystem include UEFI, Scripting Tools (Scripting Toolkit for Linux and Windows, HPE Scripting Tools for HPE Windows PowerShell and HPE RESTful API), and the HPE Smart Update solution. HPE RESTful API is compliant with the Redfish v1.0 specification (iLO version v2.30 needed). HPE iLO Scale-out and iLO Advanced for BladeSystem are available as optional upgrades. With the HPE iLO Advanced for BladeSystem licensing, you can gain additional functionality such as iLO Federation management, dynamic power capping, multi-user collaboration, and video record/playback, along with many more advanced features. You can choose from multiple levels of licensing, depending on your business needs.

With the HPE iLO Scale-out license environments like web hosting, cloud service providers, and high performance computing data centers, managing massive scale out environments—can get sophisticated scripting tools that provides remote access through Text Console via SSH, Management-at-Scale through server grouping with iLO Federation, Dynamic Power Capping, Email-based Alerting and proactive notifications.

For more details, please refer to the [HPE iLO Data sheet](#).

Refer to the [HPE Server Management Family Guide](#) for specifics.

For the complete HPE Server Infrastructure Management Portfolio, go to hpe.com/info/oneview.

Management for HPE BladeSystem

	ON SYSTEM	ON PREMISE	ON CLOUD
	(via embedded technologies)	(via HPE OneView)	(via HPE Insight Online)
Automated support case management/Contracts, warranty, and service credit management			Yes
Direct connect registration with no host server			Yes
Channel partner dashboard			Yes
Network management with HPE Virtual Connect		Yes	
Storage and SAN provisioning		Yes	
Software-defined flexibility using server profiles, templates, groups, and sets		Yes	
Advanced power, thermal, and location management		Yes	
Enterprise partner integrations: VMware vCenter, Microsoft System Center, RHEV		Yes	
Open development platform using REST APIs (PowerShell and scripting)	Yes	Yes	
Firmware maintenance	Yes	Yes	
Server provisioning configuration replication	Yes	Yes	
Integrated remote console (virtual media, folders, record/replay, virtual power management)	Yes	Yes	
Pre-boot health summary and iLO Reboot Switch (used when server is down)	Yes		
iLO federation	Yes		
Mobile App	Yes		Yes
Security: Encryption and role-based	Yes	Yes	Yes
Dashboards and downloadable reports	Yes	Yes	Yes
24x7 health, alerts, and notifications	Yes	Yes	Yes
Standardized and secure BIOS configuration via UEFI	Yes	Yes	



**HPE 8.6 kVA 24 A Three-Phase
Core Intelligent Modular Power
Distribution Unit**

Please note: Hewlett Packard Enterprise offers larger capacity Intelligent PDUs. For more information: hp.com/go/ipdu

Step 7: Choose your power and cooling configurations

The BladeSystem c7000 Platinum Enclosure provides all the power, cooling, and I/O infrastructure needed to support modular server, interconnect, and storage components today and throughout the next several years.

Power is delivered through a pooled-power backplane, and power input flexibility is provided with a choice of single-phase high-line AC, three-phase high-line AC, single-phase high voltage AC, -48 V DC, or high voltage DC.

If you want to measure the power you use, you first need to control it. With HPE Thermal Logic, you can do both. HPE Intelligent Infrastructure technology combines energy-efficient design with accurate measurement and control—all without sacrificing performance. This means you can double the capacity of HPE server blades in the data center with Dynamic Power Capping delivered through HPE OneView. The combination of HPE Intelligent Infrastructure with HPE OneView software allows you to manage all your HPE servers and storage environments from a single console—so that you can easily do more with fewer resources. Save power every second with power configurations and redundancy levels to suit your needs.

HPE created the HPE Power Advisor utility to provide more accurate and meaningful estimates of power needs for HPE ProLiant server blades. This utility can even show you how HPE Intelligent Infrastructure can help you save money by enhancing power and cooling. Learn more or download the HPE Power Advisor at hpe.com/info/poweradvisor.

HPE Intelligent Infrastructure capabilities

Active cool fans	Both high airflow and high pressure are delivered in a small size that can scale to meet future cooling needs. This technology provides the ability to optimize airflow, reduce power draw, and improve acoustic performance for any server blade configuration.
Parallel redundant scalable enclosure cooling (PARSEC) design	A hybrid model for cooling combines the best features of local and centralized cooling in a single system to offer more effective airflow and cooling for all servers. Server blades get more cooling airflow where it is needed most and use less power than traditional rack servers.
Instant thermal monitoring	A real-time view of heat, power, and cooling data is provided. If the enclosure's thermal load increases, the Onboard Administrator's Thermal Logic feature instructs the fan controllers to increase fan speeds to accommodate the additional demand. Even better, it works in reverse, using all the features of Thermal Logic to keep fan and system power at the lowest level possible. Onboard Administrator monitors the thermal conditions on the hardware in real time, without a delay for a polling cycle.
Power pooled for true N+N power redundancy	All the power in the enclosure is provided as a single pool that any blade can access, providing increased flexibility when configuring the power in the system so that you can choose the level of redundancy with which to operate. Because this power design has no zones, it facilitates both N+N and N+1 power modes, which future-proofs the enclosure for higher power requirements, if needed.
High-efficiency power supplies	High-efficiency power supplies can help you conserve power throughout your data center. These high-efficiency power supplies come standard with each BladeSystem enclosure. Both the c3000 and c7000 power supplies are up to 94 percent efficient. As a leader in energy efficiency, HPE is the first in the market to offer Platinum-level, 94 percent efficient power supplies for blade enclosures.
Dynamic power saver mode	Power load shifting improves power supply efficiency to provide real savings in power and costs. When enabled through Onboard Administrator, the total enclosure power consumption is monitored in real time and automatically adjusted with changes on demand.
Power regulator	HPE Power Regulator provides Integrated Lights-Out-controlled speed-stepping for Intel x86, AMD x86, and Intel® Itanium® 9100 series processors. This feature improves server energy efficiency by giving CPUs full power for applications when they need it and reducing power when they do not.
Power workload balancing	Power workload balancing improves performance per watt and uses HPE Power Regulator technology to manage power at the enclosure level so that power usage stays within defined power caps. Using power caps, system administrators can constrain the most BTUs per enclosure and rack to enable the enclosure to fit in an existing rack power envelope. A simple power cap allows devices to power on until power usage reaches the specified power cap, and then prevents any more devices from powering on. Power workload balancing is available now for ProLiant blades and will be available in the future for Integrity blades.
Enclosure dynamic power capping	Safely limit power usage without impacting performance by capping peak instead of average power usage. Remove risk to the electrical infrastructure with a fast-acting, hardware-based capping algorithm. Reclaim more power with blades by dynamically controlling power limits based on workload demand.
HPE Intelligent Power Distribution Unit (IPDU)	Brings state-of-the-art management and control to rack-mounted power distribution units to prevent over-provisioning of power from restricting growth in your data center. Using the core and stick architecture of the HPE Modular PDU line, the HPE Intelligent PDU monitors power consumption at the core, load segment, stick, and outlet levels with unmatched precision and accuracy. Remote management is built in, and even enables power cycles on individual outlets on the Intelligent Extension Bars.
Location discovery services	Automatically record the exact location in HPE Intelligent Series Racks, eliminating time-consuming manual asset tracking.

Step 8: Choose your services

Utilize HPE Technology Services consulting and support to help reap the benefits of today's server technology as you successfully deploy and operate new IT with minimal disruption to your current environment. HPE Technology Services delivers confidence, reduces risk, and helps customers realize agility and stability.

Connect to HPE to help prevent problems and solve issues faster. Our support technology lets you to tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, any time.

Installation and Startup will help you rapidly get up and running smoothly.

- HPE Proactive Care Services for your BladeSystem servers. We offer two versions, each with flexible hardware and software coverage windows and response times.
 - Proactive Care leverages products being connecting to HPE for personalized problem prevention, plus up to 77 percent reduction in down time, near 100 percent diagnostic accuracy and a single consolidated view of the IT environment. You will receive 24x7 monitoring, pre-failure alerts, automatic call logging, and automatic parts dispatch. If there is a problem, customers receive rapid access to expertise to stabilize your IT with start to finish call management.
 - Proactive Care Advanced is designed for servers running business critical IT. This service expands on our successful Proactive Care service by providing an assigned, local Account Support Manager who work with you to help keep your systems in peak performance with best practice advice and access to technical specialists globally, as well as critical event management to quickly address any critical issue that many arise issues.
- HPE Foundation Care is an economical alternative providing hardware and software support with a simplified choice of coverage windows and response times. This support coverage includes collaborative call management with Independent Software Vendors for assistance with leading x86 operating system software.
- HPE Datacenter Care: Our most flexible service supports your entire IT environment to provide the right mix of enhanced call management, proactive services, hardware and software support you need to manage a solution holistically for maximum control, performance, and simplicity. This is tailored to your specific needs and environment with options such as: multi-vendor support, Spare Parts service, Datacenter Infrastructure Automation, and more.
- HPE Flexible Capacity: As an option of HPE Datacenter Care, HPE Flexible Capacity delivers a public cloud experience with the benefits of public and/or on-premises IT. With this pay-as-you-grow solution, you can scale instantly to handle growth needs without the usual wait for the procurement process. Without tying up capital, your capacity never runs out.
- HPE Lifecycle Event Services: Lifecycle Event Services offers expertise for every step of the way—From strategy to design, deployment and operations, to education services. You can access this expertise where, when and how you'd like it. These services are sold on a per-event basis, and include services to help you deploy technologies and solutions as well as assessments and other services to help you optimize and operate your infrastructure. You can also hire HPE experts to augment your staff for specific projects, and partner with Hewlett Packard Enterprise to educate your staff.
- HPE Education Services: Helps address the challenge of managing costs and resources while keeping up with the latest technology.

Installation and Startup for HPE BladeSystem c-Class Infrastructure	Provides for the installation of an HPE BladeSystem c-Class enclosure, ProLiant and Integrity c-Class server blades, storage blades, and SAN switch blades, Virtual Connect modules (Ethernet and Fibre Channel), Ethernet network interconnects, and InfiniBand, as well as deployment and basic configuration of the HPE Insight Control environment for HPE BladeSystem software.
HPE Installation and Startup Service for HPE Insight Control	Provides for the deployment and basic configuration of HPE Insight Control on HPE ProLiant ML and DL series servers or HPE BladeSystem servers.
Enhanced Network Installation and Startup Service for HPE BladeSystem	Provides advanced network software configuration, including configuration of HPE Virtual Connect options.
HPE MSA Family Disk Array Installation and Startup Service	Includes service planning, service deployment, installation verification tests, and customer-oriented sessions.
HPE Proactive Care	Integrated proactive and reactive hardware and software support to help reduce outages, plus giving you rapid access to technical experts if there is an outage. Proactive Care provides start to finish call management, problem prevention, and global expertise locally.
Services for NonStop BladeSystem	Three predefined service levels provide quick installation, customized configuration, rapid start-up, and 24x7 support: <ul style="list-style-type: none"> • Critical Service Solution • Foundation Service Solution
HPE Evolution Services for NonStop BladeSystem	Mission-critical support addresses the diverse factors that impact system performance and availability. This encompasses not just hardware and system software, but also IT management processes, applications and databases, networks, environmental factors, and more. Learn how HPE can help enhance uptime, performance, operations, and security across your NonStop system environment by speaking with your HPE NonStop representative for more information.
HPE Education Services for NonStop BladeSystem	HPE NonStop Technology Education is your source for training on HPE Integrity NonStop servers and software. Choose from a broad range of courses, locations, and training media to make sure your HPE NonStop system education is perfectly tailored to your requirements, operations, and security. Learn more at hpe.com/info/services

For more information

For more information, visit hpe.com/services.

You can also contact your local HPE sales representative or Authorized HPE ServiceOne Partner.

To stay relevant, your employees need to quickly assimilate new IT skills. We offer a variety of HPE training services, including instructor-led courses, customized onsite training, and innovative remotely assisted courses. For more information, visit hpe.com/ww/learn.



HPE Integrity Systems

The newest HPE Integrity Systems; HPE Integrity Server blades with HP-UX and HPE Integrity NonStop BladeSystem, combine years of trusted HPE Integrity resiliency with new innovations and HPE BladeSystem efficiencies.

Converged Infrastructure, Integrity systems offer:

- A common modular architecture from x86 to Superdome 2 to NonStop
- Always-on resiliency—a secure and reliable infrastructure from CPU to solution
- Dynamic optimization—integrated management and virtualization to scale resources desirably
- Investment protection and stability—sustained innovation, decades of support life, and compelling value

HPE Integrity Server blades with HP-UX

HPE Integrity and HP-UX—the highly-resilient UNIX® system for workloads vital to the enterprise—have been engineered to provide business continuity. Consistently delivering mission-critical availability to core business functions and applications for over three decades, HP-UX provides a robust platform that ensures your business is always-on, and delivers the foundational values of the HPE Mission-Critical Converged Infrastructure:

- Availability—HPE Integrity servers are designed for high availability, enabling your mission-critical workloads to be always-on and secure without compromise.
- Efficiency—Delivering built-in integration of virtualization and management software to optimize your IT infrastructure dynamically.

- Proven stability—Integrity servers play a central role in the daily operations of most of the world's largest corporations, including many Fortune 1000 companies. With these servers you can be confident in your ability to meet even your most stringent service-level objectives for availability and performance.

The HPE Integrity BL860c i4 Server Blade, HPE Integrity BL870c i4 Server Blade, and HPE Integrity BL890c i4 Server Blade are flexible and versatile two-, four-, and eight-socket systems that are ideal power for your most vital workloads. With support for hard partitioning (HPE nPars), HP-UX Virtual Partitions (HP-UX vPars), and HPE Integrity Virtual Machines, these Integrity server blades give you mission-critical levels of virtualization availability and flexibility. Additionally, embedded HPE Virtual Connect FlexFabric offers increased network scalability and configuration flexibility while reducing infrastructure costs by converging LAN and SAN traffic on the same connection. With wire-once connectivity, IT administrators can manage all subsequent “rewiring” virtually, significantly reducing cabling. These HPE Integrity server blades feature the unique HPE Blade Link technology, which combines multiple blades to create two-, four-, and eight-socket systems—providing greater scalability and flexibility.

What's more, you can mix and match HPE Integrity, HPE ProLiant, and HPE Storage blades within the same enclosure, to grow flexibly as your business demands change. These HPE Integrity server blades offer up to 3X the performance of the previous generation, double the core count, and support a robust virtualization infrastructure. It's time to speed up, scale up, and strengthen your server infrastructure with the new line of Integrity server blades.

Speed up your mission-critical applications: The Intel Itanium Processor 9500 Series with up to 2.53 GHz clock speed makes the new HPE Integrity server blades the fastest HPE Integrity server blades available today.

Scale up to increase performance: With the HPE Integrity server blades, you can now experience true mission-critical converged infrastructure flexibility along with the modular and scalable design of the HPE Integrity server blades.

Strengthen with improved reliability and increased manageability: The new HPE Integrity server blades offer massive flexibility and availability with electrically isolated hard partitions (nPars). These HPE Integrity server blades come with industry-leading workload management features, such as HP-UX vPars, HPE Global Workload Management (gWLM), and resource management capabilities such as mission-critical virtualized UNIX (HP-UX 11i v3), infrastructure orchestration, and HPE Integrity Integrated Lights-Out 3 (iLO 3).

Learn more about the advantages of HPE Integrity server blades at hpe.com/servers/integrityblades.



HPE Integrity NonStop BladeSystem

If you are an organization that requires 24x7 application availability, real-time high-volume transaction processing, and exceptional security, consider the HPE Integrity NonStop BladeSystem NB56000c. Representing the top of the line offering of the HPE Integrity NonStop systems family, the NonStop NB56000c is 4-core capable with up to 1.5X the performance capacity as compared to the NonStop NB54000c. The NB56000c can also be licensed as a 2-core server at a lower software price point. A 2-core licensed NB56000c can be upgraded to a 4-core licensed NB56000c to increase performance capacity anytime during the life of the platform. You can perform core upgrades online without taking the system out of service. The NonStop NB56000c combines the economies of newly enhanced standards-based, modular computing with the trusted 24x7 fault-tolerant availability and data integrity of the HPE NonStop architecture. Its enhanced availability, manageability, and development features create a total solutions approach, offering a low total cost of ownership (TCO) for complex mission-critical applications.

The HPE Integrity NonStop BladeSystem NB56000c is built on the proven HPE Integrity BL860c i4 server blade and leverages the modular efficiencies of the industry-leading HPE BladeSystem c7000 Platinum Enclosure (R3) with fault-tolerant BladeSystem ServerNet double-wide switches. The NB56000c is powered by Intel Itanium 9500 series processors, as the processing engine. The HPE NonStop OS leverages powerful multicore processing to achieve a significant boost in performance. NonStop OS (J-Series) greatly improves the computing capacity of the platform and extends the acknowledged linear scalability of NonStop systems to a new level.

Carrier-grade HPE Integrity NonStop BladeSystem NB56000c-cg

The carrier-grade HPE Integrity NonStop BladeSystem NB56000c-cg is NEBS Level-3 certified and is specifically designed to deliver increased performance capacity, CLIM availability with dual RAID 1 CLIM OS disks and all the capabilities you need to compete in the dynamic telecommunications space.

The Telco CLIM supports up to five 1GbE copper ports or three copper and two fiber ports and the following three protocols: M3UA, Diameter, and Session Initiation Protocol (SIP).

HPE NonStop—Because customers never wait

The HPE NonStop platform offers so much that is new, and continues to provide the highest levels of availability and near-linear scalability of any server in today's marketplace—with hardware, operating system, database, software, and applications packaged as part of a well-integrated stack.

For real-time processing of ATM or payment transactions, telecommunications service, follow-the-sun access to operational data, or on-demand health information... you can trust it will be available with HPE Integrity NonStop Servers.

Learn more about the advantages of HPE Integrity NonStop BladeSystem at hpe.com/info/nonstop.

Related offerings

HPE BladeSystem telecom solutions

The HPE ProLiant BL460c Gen8 carrier-grade server blade is a dual-socket server blade engineered for unprecedented performance, enhanced flexibility, and simplified management, which makes it the standard for data center computing. It packs in more performance with a 33 percent increase in memory DIMM count, Intel Xeon E5-2600 v2 Processors, faster I/O slots and enhanced Smart Array Controller that now ships with 512 MB Flash Back Write Cache standard. In addition, it is also more flexible with the HPE FlexibleLOM, which provides the ability to customize server networking today and the ability to meet future needs without overhauling server hardware. All certified to NEBS Level-3 the HPE ProLiant BL460c slots into the world's most popular blade environment, the HPE BladeSystem.

- Run telecom critical applications at volume economic levels
- Meet telecommunication requirements with NEBS Level-3 and ETSI certifications
- Stabilize and future-proof your system with extended lifecycles
- Mix and match ProLiant blades in the same c7000 enclosure to optimize your workload

HPE High Performance Computing (HPC) clusters

Scale out your HPC infrastructure with the fastest blade systems available, featuring more processors, greater energy efficiency, and increased cooling capabilities. HPE BladeSystem-based clusters are fully integrated, tested, and ready for the most demanding workloads.

Learn more about HPE HPC clusters [here](#).

HPE ConvergedSystem

Taking IT simplicity and efficiency to new heights, HPE ConvergedSystem is a portfolio of integrated systems optimized for critical workloads like virtualization, cloud, and Big Data. These purpose-built building blocks are designed for speed and efficiency. Each ConvergedSystem includes all the servers, storage, networking, management, and third-party software you need—in a system that's simple to buy, support, and manage.

Uniting market-leading HPE Converged Infrastructure with decades of experience in solution design, HPE ConvergedSystem offers a performance-optimized, total systems experience that dramatically simplifies your IT. Through quick deployment, automated management, and system-level support, your IT staff can be freed up to innovate.

HPE ConvergedSystem 700 for Virtualization

For demanding environments with 100–1000 VMs or more, the ConvergedSystem 700 is the smart choice. It's pre-configured and delivered ready to run, enabling you to regain control of capital and operational expenditures. The HPE ConvergedSystem 700 for Virtualization with VMware is designed for ease of use and simplicity to help you quickly harness the full potential of virtualization. It is a pre-integrated, pre-configured, and modular system providing a secure and reliable turn-key data center in a box experience.

This turn-key solution is built on standard and reliable modular infrastructure blocks including HPE BladeSystem and an HPE 3PAR storage array featuring:

- Compatible operating systems: VMware vSphere 5.5 for virtualization hosts, VMware vCenter 5.5 for management, Microsoft Windows 2012 R2 Datacenter
- Supported storage: HPE 3PAR StoreServ 7200 2-node storage with 36 x 15k 300 GB drives in base (10.8 TB) with up to 144 total (43.2 TB)
- Networking: HPE Virtual Connect FlexFabric, HPE 5900 series top of rack switches
- Integrated management: HPE OneView
- Workload Supported: General-purpose virtualized application support. HPE App Maps combine HPE ConvergedSystem with ISV best practices to provide workload-specific configurations and guidance for targeted workloads like client virtualization and SQL consolidation to reduce design cost and deployment time.

The HPE ConvergedSystem 700 for Virtualization is designed for convergence, ease of use, and simplicity. Enabling you to truly harness the full potential of virtualization, HPE ConvergedSystem 700 for Virtualization is pre-integrated, which simplifies the installation of the complete system. The flexible HPE ConvergedSystem 700x provides maximum scalability with enhanced application performance and availability. The systems also support VMware vCenter and Microsoft System Center for automating the management of a broad pool of data center resources.

Learn more about HPE ConvergedSystem 700 for Virtualization at hp.com/go/converged.

HPE CloudSystem

HPE CloudSystem is a complete solution for building and managing cloud services in a private or hybrid model—on- and off-premise using a combination of private, managed, and public clouds. With HPE CloudSystem, you can automate the infrastructure-to-application lifecycle and manage your services throughout—from provisioning to monitoring and through to retirement. Powered by a hardened, enterprise-grade set of OpenStack® technologies, HPE CloudSystem works out of the box, so you can build your solution quickly, even with multi-hypervisor, multi-OS, and heterogeneous infrastructures.



Hewlett Packard Enterprise delivers the industry's most complete, integrated, and open solution for building and managing clouds. Only HPE CloudSystem enables you to:

- Make cloud users more productive through a consumer-inspired interface
- Gain control of your hybrid cloud from a single platform that includes broad support of virtualization technologies and public clouds
- Get up and running quickly—install and deploy in hours, create cloud services in minutes
- Grow as you need with a built-in upgrade path from basic infrastructure cloud services to advanced application cloud services

Hewlett Packard Enterprise offers two optimized, reliable systems built on standardized HPE Converged Infrastructure. Start with basic Foundation capabilities, or go with the advanced features of CloudSystem Enterprise.

CloudSystem Enterprise is a hybrid cloud platform for delivering advanced infrastructure and application services in minutes. This offering features a sleek new user interface and integrates capabilities previously delivered through separate products, making holistic management of all cloud services easier than ever before. HPE CloudSystem Enterprise enables you to:

- Automate the delivery of advanced infrastructure and application services in minutes
- Drive enterprise-class lifecycle management for cloud services—from initial provisioning through ongoing scaling, updating, and monitoring through to retirement
- Configure and manage hybrid clouds, with out-of-the-box support for HPE Helion Public Cloud, Amazon Web Services, Microsoft Azure, and the global network of HPE CloudAgile bursting partners
- Provide service portability in hybrid environments with Topology and Orchestration Specification for Cloud Applications (TOSCA)-compliant service designs
- Customize approvals, service delivery, and cloud administration tasks, delivered via the HPE Operations Orchestration workflow engine
- Configure optional advanced service automation, including patch and compliance management with HPE Server Automation plus sophisticated database and middleware management with HPE Database and Middleware Automation software
- Integrate capacity planning and disaster recovery, delivered by Matrix OE software

CloudSystem Foundation drives the delivery of core infrastructure services in an enterprise-grade environment. Use this solution to deliver Infrastructure as a Service (IaaS) quickly, or as a starting point on your journey toward more sophisticated cloud service delivery. CloudSystem Foundation delivers:

- Simple infrastructure services within minutes, powered by an enterprise-grade version of OpenStack technology, enhanced and curated by Hewlett Packard Enterprise
- Open APIs for both administrative and cloud service functions, including OpenStack APIs that enable highly automated cloud delivery
- Simple administration integrated with HPE OneView for infrastructure management
- Fast and easy installation via a software appliance delivery model
- Seamless upgrade to CloudSystem Enterprise

Learn more about HPE CloudSystem at hpe.com/info/cloudsystem.

Optimize your IT investment strategy with new ways to acquire, pay for and use technology, in lock-step with your business and transformation goals.

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HPE ProLiant Gen9 servers

Delivering the right compute for the right workload at the right economics—every time

When the time is right to purchase new servers for your growing enterprise, choose systems purpose-built for the New Style of IT—HPE ProLiant Gen9 servers. Backed by a converged management platform (i.e., HPE OneView), the ProLiant Gen9 server portfolio accelerates IT service delivery and boosts business performance through optimization for multiple workloads—unlocking your data center for future growth. The HPE ProLiant Gen9 compute infrastructure collectively:

- Redefines compute economics—Offering 3X compute capacity²⁶ with lower total cost of ownership (TCO) to maximize data center capabilities
- Accelerates service delivery—Improving service delivery by 66X for a competitive advantage,²⁷ while also improving service-level agreement (SLA) performance
- Boosts business performance—4X faster workload performance²⁸ to transform your business

HPE BladeSystem: your ultimate converged infrastructure

HPE BladeSystem not only can handle any workload, but can also deliver the best value across workloads of any converged infrastructure on the market today. With HPE BladeSystem, you can transform the economics of your IT investment, large or small.

All of this adds up to big savings for your IT budget that can be reinvested back into your business. With HPE Converged Infrastructure in place, you can also deliver top-line business results to grow, get to market faster, and empower your employees, partners, and customers.

Wherever you plan to take your business in the future, HPE BladeSystem is ready to help you get there.

Learn more at
hpe.com/info/bladestystem

²⁶ HPE Internal analysis. Comparison between DL380 Gen9 vs. DL380p Gen8 with Sandy Bridge processors. Source for system wattage was IDC Qualified Performance Indicator located at spicertificate.idc.com/. Performance taken from SPECint_rate_base2006 industry benchmark. Calculation: Performance/Watt, August 2014.

²⁷ IDC white paper sponsored by HP (now Hewlett Packard Enterprise). Achieving Organizational Transformation with HPE Converged Infrastructure Solutions for SDDC, January 2014, IDC #246385.

²⁸ SmartCache Performance done with equivalent controller in a controlled environment. HPE Smart Storage engineers, Houston, TX as of 18 May 2014.



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