

HP Cluster Platform 6000

A component of the HP Unified Cluster Portfolio



The better choice

Cluster computing is now even more compelling. You are no longer limited to past extremes, such as the overwhelming complexity of building your own cluster system or the claustrophobic restrictions of pre-configured, factory-built solutions.

With the HP Unified Cluster Portfolio, HP has combined the flexibility of a custom solution with the simplicity, reliability, and value of a pre-configured, factory-built product. A wide range of qualified options ensures flexible choices, simple implementation, and successful results. The foundation of the Unified Cluster Portfolio is the HP Cluster Platforms that provide customers with a choice of processors, operating systems, and interconnects. The HP Cluster Platforms 3000, 4000, and 6000 all are integrated, customer-ready solutions that enable rapid and confident deployment of High Performance Computing (HPC) clusters.

More simplicity, agility, and value

The HP Cluster Platform 6000 features HP Integrity servers with Intel® Itanium® 2 processors and a choice of Quadrics, InfiniBand, or Gigabit Ethernet cluster interconnects. Support is offered for either Linux® or HP-UX operating environments, as well as numerous middleware options. Available in configurations from 4 to 512 compute nodes (more by request), the HP Cluster Platform 6000 also includes packaging options for density or expandability. The clusters are built to uniform, worldwide specifications and are fully integrated with HP warranty and support.

Are you planning to build a custom solution with unlimited flexibility, but you're concerned with excessive complexity, high costs, and no guarantee of success? Or have you settled for a pre-configured, factory-built solution that is tested for success, but your options are limited and changes require expensive customization? If neither option sounds appealing to you, you're not alone. Customers are demanding a better choice!



Intel Itanium 2 processor technology

The HP Cluster Platform 6000 features the Intel Itanium 2 processor-based Integrity servers as the compute and control nodes. Co-developed by HP and Intel, the revolutionary Intel Itanium architecture reduces platform costs and enables higher performance and scalability. The Itanium 2 processors include extensive instruction-level parallelism and chipsets that offer massive on-chip resources (large number of floating point registers, large L2 cache on die), thereby reducing memory operations for complex workloads. Integrity servers deliver superior 64-bit performance and offer optimal performance in complex technical applications, such as seismic analysis, molecular modeling, and structural mechanics.

It is simple to design a Cluster Platform 6000 to meet your requirements. First, select the compute nodes that best support your software and application requirements. The Cluster Platform 6000 offers dual processor Integrity rx1620 and rx2620s, as well as the four-way rx4640 servers, all of which can be combined in the same cluster. Next, select either the rx2620 or rx4640 as the control node, based on requirements such as number of I/O interfaces. Additional rx2620 and rx4640 servers can be added (utility nodes) to allow expansion of cluster capabilities for administrative functions such as file services or additional log-in servers. Gigabit Ethernet and InfiniBand cluster interconnects are available for both Linux and HP-UX implementations, with Quadrics offered for Linux.

Extensive software options

HP Cluster Platforms are designed to support standard cluster deployments using popular open source Linux software stacks, such as Open Source Cluster Application Resource (OSCAR) and NPACI/Rocks. HP complements this open source option with a set of commercial products developed and supported by HP or its partners. All HP Cluster Platform 6000 software offerings are tested and verified by HP or its partners to run on the platform, enabling rapid deployment and a comprehensive environment for high performance computing.

HP available software for the HP Cluster Platform 6000 includes a choice of Linux (Red Hat or SUSE subscriptions) or HP-UX. With the operating system, HP includes HP Service Care Packs, which provide access to HP's experienced service professionals and hands-on cluster expertise. A flexible, modular product menu supports a range of customer preferences, from delivery of a 'basic hardware only' configuration to full installation and support of a comprehensive cluster management suite on the platform.

The HP Cluster Platform 6000 can be delivered with optional cluster management software products.

- The HP-developed XC System Software v2.0 integrates leading open source cluster packages with the Linux

operating system, HP-MPI, and Platform Computing's LSF. The XC System Software provides single-system management for job scheduling, resource scheduling and launch, and simplified software installation, resulting in enhanced ease of use and unprecedented levels of productivity and scalability.

- hptc/ClusterPack, an HP-UX-based solution, provides a single point of access for cluster system administration, cluster system resource control and monitoring, and distributed workload management.
- Scali and HP have partnered to deliver Scali Manage™, an independent, high performance Linux cluster management solution that provides comprehensive tools for system installation, configuration, management, and monitoring. The latest version includes support for enhanced scalability and the ability for greater visibility into cluster/grid operations.

To ensure customers have a powerful set of tools for developing cluster applications, HP provides Fortran, C and C++ compilers for HP-UX, along with debugger (WDB) and profiler (Caliper). HP also provides highly customized mathematical subroutine libraries (HP MLIB) and Messaging-Passing Interface (HP-MPI). HP-MPI incorporates MPI2 functionality and MPICH compatibility, while supporting multiple high performance interconnects. Both HP MLIB and HP-MPI are available for Linux and HP-UX. HP Cluster Platforms also are available with Scali MPI Connect™, a fully integrated MPI solution that enables companies to take advantage of diverse high performance interconnects and utilize demanding application software capabilities. In addition, HP Cluster Platforms support popular MPI implementations, such as MPICH.

To complete the software development portfolio, HP is allied with leading suppliers of software development tools. With its partners, HP offers a complete Itanium processor-based HPC software development environment. Partners and solutions include the following:

- Intel Fortran, C, C++ compilers—the Intel Math Kernel Library (MKL), optimized for Intel Itanium processors and Intel cluster tools (Trace Analyzer and Collector) – available on Linux
- The Numerical Algorithms Group (NAG) and Visual Numerics IMSL—Fortran and C libraries (Linux)
- Wolfram Research—Mathematica and gridMathematica interactive mathematics environment (Linux)
- Allinea Software, LTD—DDT debugger for parallel debugging
- The University of Oregon—Tuning & Analysis Utilities (TAU) for multi-threaded (OpenMP) and distributed parallel (MPI) applications (Linux)

	Features	Benefits
Simplicity	Integrated, customer-ready solutions	Enables cost-effective, rapid deployment
	All software is tested and verified by HP and/or partners to run on the HP Cluster Platforms	Provides a comprehensive environment for high performance computing
	Clusters are built to uniform, worldwide specifications	Provides ease of implementation and use
Agility	Broad choice of processors, interconnects, and middleware	Provides a wide range of hardware/software to meet specific needs
	Intel Itanium 2 processor-based Integrity servers as the compute and control nodes	Delivers superior 64-bit performance and excellent performance in complex technical applications
Value	Fully integrated with HP warranty and support	Provides industry-leading expertise
	Partnerships with leading suppliers of software development tools	Offers customers a powerful set of tools for developing cluster applications
	Optional on-site systems software support, applications development and optimization, and clusters training	Enhances the HP Cluster Platforms to achieve best possible results

- Etnus, Inc.—TotalView debugger for parallel debugging
- Scientific Computing Associates, Inc. (SCA)—Linda Virtual Shared Memory Library
- Platform Computing LSF (also included in the XC System Software Stack) and Altair PBS Professional—for batch scheduling and workload management

A complete list of partners is available at www.hp.com/go/clusters.

Scalable storage and visualization

Recent technology advances in computational performance has outpaced capabilities in scalable storage, I/O, and visualization tools. HP has solved these challenges with two revolutionary offerings in the Unified Cluster Portfolio—the StorageWorks Scalable File Share, based on Lustre technology, and HP Scalable Visualization. Both products allow Linux users of the HP Cluster Platform 6000 to use leading edge technology in storage and visualization to meet their most demanding compute-intensive research projects.

Tuning and customization with HP Services

Enhance your HP Cluster Platform 6000 by using HP custom services. Options include on-site systems software support, applications development and tuning, and clusters training. Also, you can choose to have your own software installed and tested in HP factories—all with support from the HP Consulting and Integration Services team.

The modular design and flexible options of the Unified Cluster Portfolio allows customers to pick and choose all or part of the portfolio. Customers may purchase only the HP hardware, which provides complete hardware support from HP. Alternatively, they may choose a combination software and hardware solution, with software certified and supported by HP software partners and hardware supported by HP. Lastly, customers can choose the full solution from HP—a fully supported and unified software and hardware product.

HP Cluster Platform 6000

Specifications

HP Cluster Platform 6000			
Platform	HP Integrity rx1620 server	HP Integrity rx2620 server	HP Integrity rx4640 server
Node type	Compute	Compute, Control or Utility	Compute, Control or Utility
Processor	Intel Itanium 2 1.3GHz (3 MB cache, 400 MHz FSB) 1.6GHz (3 MB cache, 533 MHz FSB)	Intel Itanium 2 1.3 GHz (3 MB cache) 1.6 GHz (6 MB cache)	Intel Itanium 2 1.5 GHz (4 MB cache) 1.6 GHz (6 or 9 MB cache)
Processors per node	2	2 if compute, 1 or 2 if control node	2 or 4
Memory per node	1–16 GB	1–24 GB	1–128 GB
Disk/Media bays	2 drives	3 drives	2 drives
I/O Slots	2–64 bit/133 MHz PCI-X	4–64-bit/100 MHz PCI-X	4–64-bit/66 MHz PCI-X 2–64-bit/133 MHz PCI-X
Form factor	1 U	2 U	4 U
Cluster interconnect	Quadrics QSNNet II, InfiniBand, Gigabit Ethernet		
Management network	10/100 network or Gigabit Ethernet		
SAN Storage in cab	Optional MSA1000 Storage subsystem mounted in cabinet as part of cluster		
Operating System options	Linux: Red Hat Enterprise Linux 3.0 or 4.0; SUSE SLES 8 or 9 ¹ , HP-UX 11i v2 (up to 128 nodes, GigE and InfiniBand only)		
Operating environment tools	Linux: HP-MPI and HP MLIB, Scali MPI Connect HP-UX: HP TCOE including HP-MPI, HP MLIB		
Cluster management software options	HP XC System Software v2.1 Scali Manage ClusterPack for HP-UX		
Packaging: (available in two styles)	<ul style="list-style-type: none"> High density packaging: designed for optimal footprint and lowest entry price, available up to 128 compute nodes (delivered in 4 cabinets) Modular packaging: designed for expandability, with racks assembled as compute building blocks for compute nodes and network switches, utility building blocks for control nodes and other cluster administration tasks, optional racked monitor and keyboard, and interconnect building blocks for high performance interconnect switches 		
Services	HP Enhanced Services available for HP Cluster Platforms. HP offers on-site field installation. HP software support available for operating systems and HP software options.		
Warranty	Standard hardware warranty on platforms, based on underlying components		

¹The standard, supported offering for the Quadrics implementation on the HP Cluster Platform 6000 is HP's XC System Software. Red Hat, SUSE and HP-UX do not support or certify Quadrics interconnect. Consult your HP representative for information on custom implementations of the HP Cluster Platform 6000 with Quadrics.

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For more information, go to www.hp.com/go/clusters

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