HP High Performance XC Clusters

Scale out, scale simply

HP is transforming the landscape of the Linux cluster environment—providing high-performance technical computing (HPTC) users with an easier way to increase performance and lower costs. The new HP-engineered HP XC6000 and HP XC3000 Clusters deliver the simplicity of single-system administration with robust, industrial-grade Linux solutions.

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Once found primarily in university or scientific research settings, the Linux compute cluster is becoming a desirable production technology for the enterprise because of its openness, flexibility, performance, low cost, and reliability. In fact, compute clusters are fast replacing the traditional shared-memory parallel systems used in complicated design, simulation, and modeling applications. Multiple servers in a cluster can run portions of the application in parallel, dramatically increasing performance as more compute nodes are added. Using clusters allows scientists and engineers to scale out, achieve higher performance, advance computing technology, and strive for bleeding-edge results—all with an affordable price tag.

However, there are some obstacles hindering Linux clusters. As nodes are added to large clusters, the communication and administration loads affect performance and price. Previously, the available management and support infrastructure for large, Linux-based clusters has not been robust enough for production sites. In addition, multiple source hardware and software components have presented maintenance and support issues.

The HP advantage—transforming the landscape

HP, the leader in HPTC clustering technology, has removed these obstacles by simplifying and supporting the deployment of Linux clusters. With the introduction of the HP XC Clusters, HP is providing HPTC users with an easier way to increase performance and lower costs.

HP XC Clusters

The HP-engineered XC6000 and XC3000 Clusters combine single-system simplicity with high-performance scalability to deliver unprecedented levels of ease of use and productivity. The 64-bit HP Integrity and 32-bit HP ProLiant servers are at the core of HP XC Clusters, delivering outstanding supercomputing performance, memory capacity, mass storage capabilities, and scalability at an extremely attractive price tag. The initial cluster offerings scale from 34-processor (204 GFLOPS) to 512-processor (3 TFLOPS) configurations, with even larger configurations available by request.

HP completes the offering with innovative system software that leverages industry-leading technology from HP and its partners. HP's integration of world-class solutions ensures optimal interconnect performance and throughput of parallel applications. In addition, the XC System Software provides users and system administrators with single-system attributes of management and system resource usage, resulting in unprecedented levels of ease of use, productivity, and scalability.

The XC System Software includes technology from the open source community and from HP partners Cassatt Corporation and Platform Computing, integrated by HP into a single, unified production system. A range of industry-leading solutions are also included, such as the fastest message-passing interconnects from Quadrics and Myricom, Inc., ensuring optimal interconnect performance and throughput of parallel applications.

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In addition, network management software developed by HP provides Linux customers with solutions optimized for HP hardware. For example, to effectively combat distributed file system I/O challenges, HP leads the industry with the implementation of Lustre, a high-performance, highly scalable, Linux-based file system designed to work on large compute clusters.

HP XC6000 Cluster

HP's co-development role in the powerful Intel® Itanium® architecture significantly increases the power and commercial appeal of cluster computing. Recently announced HP Integrity servers provide Linux clusters with a revolutionary architecture that reduces platform costs and enables breakthrough performance and scalability. Up to two times faster than its predecessor, the Intel Itanium 2 processor is easily outpacing the performance of classic RISC-based systems. The HP XC6000 is available with the HP Integrity rx2600, a dual-processor server available with multiple implementations of the new Intel Itanium 2 processor 6M complemented with a 6.4 GB/s processor bus and 8.6 GB/s of memory bandwidth. The cluster is also available with the newly announced HP Integrity rx1600 server, delivering dual-processor Itanium 2 microarchitecture performance in a thin 1U form factor. The HP XC6000 uses high-speed Quadrics ELAN interconnects and is integrated with HP's XC System Software.

HP XC3000 Cluster

The HP XC3000 Clusters use ProLiant DL380 G3 and DL360 G3 nodes based on the Intel Xeon dual processor. The Intel Xeon processor family is designed specifically for front-end applications and price-driven high-performance compute clusters, where performance and scalability are key. The XC3000 utilizes the rack-optimized DL360 G3 servers (with choice of 3.2 GHz or 3.06 GHz Xeon processors) as application nodes; its DL380 G3 nodes are dedicated service nodes directing the management and administrative functions within the cluster. The HP XC3000 is connected by high-speed Myricom Myrinet XP interconnects and integrated with HP's XC System Software. As with the XC6000, the XC System Software exploits the integrated remote console management capability of the servers to control power and the boot process as well as provide system health metrics to the administrator.

Comprehensive product support and services

The XC Cluster is an integrated, turnkey product, with HP providing a single point of support for the comprehensive offering: server nodes, interconnects, the operating system and environment, drivers and libraries, and the cluster management software. HP offers service and support up to and including the Platinum support level.

HP Services offers a full range of consulting and integration services designed specifically for Linux clusters and the XC Clusters. Services include Implementation Program Management; Linux Cluster Systems Quickstart; and Linux Cluster Applications Migration, Development, and Optimization as well as training on Linux system administration and cluster management.

HP Linux Development Environment for HPTC

HPTC customers often create their own software applications for HP's Linux clusters. HP, working with numerous partners, is ensuring that a powerful set of tools are available for developing applications designed to take advantage of XC Clusters. These tools include TotalView parallel debugger from Etnus, Inc.; Intel Fortran and C/C++ compilers; and Vampir/Vampirtrace MPI performance analysis tool from Pallas, as well as HP's own Mathematics Library (MLIB).

HP XC Clusters —product offerings

	HP XC6000 Cluster	HP XC3000 Cluster
Processors	Intel Itanium 2: 1.5 GHz/6 MB cache, 1.3 GHz/3 MB cache, 1.4 GHz/1.5 MB cache, 1.0 GHz/1.5 MB cache	Intel Xeon 3.2 GHz or 3.06 GHz, both with 533 MHz FSB
Compute nodes	HP Integrity rx2600 server	HP ProLiant DL380 G3, DL360 G3
High-speed interconnects	Quadrics ELAN	Myricom Myrinet XP
Linux distributions	Fully Linux Standard Base (LSB)–compliant Linux distribution, supported by HP	
Middleware	XC System Software, with SSI simplicity, plus Platform's LSF and HP MLIB	
Support and services	Full range of service options, including CarePaqs and support contracts from Bronze up to and including Platinum service levels. Consulting and Integration Services offer customer support specifically designed for XC Clusters, including program management, training, and Quickstart services.	

HP XC Clusters: key features and benefits

	Feature	Benefit
Scale out	• Wide range of 32-bit and 64-bit computing platforms • Industry-leading, breakthrough performance with Integrity and ProLiant hardware • High-speed Quadrics ELAN and Myricom Myrinet interconnects • Support for Lustre High Performance File System (available in 2004)	• Customers choose best hardware to meet HPTC needs • High performance scalability • Optimal interconnect performance and throughput of parallel applications • High-bandwidth, high-performance, coherent scalable file system
Scale simply	• Leadership HPTC cluster expertise • Alliances in open source and commercial application communities • HP developed and supported XC System Software	• Expert implementation, design support, and training • Superior support, maintenance, and optimum performance of the Linux kernel • Single-system-image simplicity for unprecedented levels of ease of use, productivity, and scalability • Standard supported comprehensive software environment

To learn more, visit www.hp.com/go/linuxclusters.

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