



Catalan high-performance computing center chooses Bull to improve its services aimed at the scientific community and facilitate research

14 research groups have already tested the new Bull supercomputer in areas as diverse as chemical engineering, materials science, astrophysics and pharmacology.

Since mid-May 2009, users at CESCA (the Catalan intensive computing center) have had access to a new Bull supercomputer for calculation and computer simulation. The new installation, code-name Prades, includes 240 processing cores. The system has significantly enhanced CESCA's computing capacity, which now delivers up to 4.13 Teraflops of peak power. Thanks to the new supercomputer, users have an ultra-fast cluster system at their disposal, with shared memory, and featuring an InfiniBand network.

Once the installation and benchmarking were completed, even before the system went into full production users were able to see for themselves how the actual system performed. In total, the 14 research groups used over 130,000 hours of computing time in areas including chemical engineering, materials science, astrophysics and pharmacology. The scientists involved came from various research centers and universities, including CSIC (*Consejo Superior de Investigaciones Científicas*, the Higher Education Scientific Research Council), the *Fundación Observatorio Esteve Duran*, IMDEA (the Madrid Institute of Advanced Studies), the University of Barcelona, the Polytechnic University of Catalonia, the Autonomous University of Barcelona and the University of Gerona.

Key features of the Bull supercomputer

The new Bull Prades system is a cluster of 14 Bull R422 E1 servers, featuring 28 nodes and 56 Intel® Xeon® 3.0 GHz quad-core processors (making a total of 224 cores), with 896 GB of memory and 31.72 TB of disk storage. The system also includes a dual-node server dedicated to system management and Input/Output control; with each node comprising two 2.5 GHz quad-core processors, with 1 TB of disk space and 8 and 16 GB of memory respectively. The cluster is capable of 2,688 million floating point operations a second, representing 2.7 Teraflops of power.

The ultra-compact, Bull R422 E1 'twin' server features Intel® Xeon® quad-core 5400 series technology (Harpertown). This server delivers an optimized price/performance ratio and has been specially designed to be integrated as a compute node in intensive computing clusters. The modular rack architecture, with two nodes per U, enables certain elements to be extended in response to evolving needs. In the rack, only 20U of the available 42U are currently filled, leaving 22U free for future extensions of the system.

Prades, a cluster featuring an ultra-fast InfiniBand network

The Prades supercomputer features three networks: two Gigabit Ethernet (GbE) networks – one for system management and the other for service – with the third being an InfiniBand network dedicated to processing, enabling optimal performance for 'moderately parallel' applications. The GbE networks include a 48-port gigabit switch which includes one 10 GB port. Two InfiniBand switches have been installed to support the InfiniBand network: one for internal management tasks and the other for external tasks. In addition, each node features a dual-port InfiniBand board.

When it comes to administration of the Prades system, the configuration includes *Bull Advanced Server for Xeon* software, which is designed specifically for managing HPC cluster environments and enables thousands of nodes to be administered. The software incorporates *RedHat Enterprise Linux 5* and *Bull System Manager HPC Edition*, and enables the cluster to be effectively administered and controlled using a powerful tool, via a Web interface which simplifies repetitive tasks and enhances security by rationalizing system administration.

Bull system performance

The installation of the Bull system has involved running a large number of benchmarks, to evaluate the performance and scalability of the system for parallel processing. These include the five most relevant benchmarks for materials science (CMT) based on Gaussian software, and a bio-medical and life sciences benchmark (CBV) based on Amber (a molecular simulation program).

The results achieved were 163% higher than those obtained on the hardware installed in 2006.

In summary, the result of the tests carried out clearly demonstrate the excellent performance of the Bull cluster in CESCA's operating environment, which involves moderately parallel tasks requiring a great deal of memory and disk capacity.

About CESCA

CESCA's mission is to manage a very large-scale complex of computing and communications systems, to provide services to universities and the research community, based on five areas of activity: communications networks; portals and databases for university information; systems for scientific computing and data storage; promoting the use and benefits of these technologies; and operating and maintaining the Center's entire infrastructure.

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