

Sun Constellation System

Departmental deployments to petascale computing



Sun has defined a new era of open, scalable, high-performance computing with the Sun Constellation System. The Sun Constellation System is the result of a system-level innovation that builds on cost-effective, off-the-shelf components and state-of-the-art technologies, and delivers an open, petascale architecture. Using a holistic approach for an integrated yet modular system that includes servers, software, storage, and services, Sun is creating one of the most powerful High Performance Computing (HPC) platforms in the world. The Sun Constellation System requires less energy to operate than competitive solutions because of its designed-in power and cooling efficiencies. Applications can be quickly created using familiar tools and interfaces in small environments, and then rapidly scaled up and deployed to environments capable of providing up to 2.5 petaFLOPS of peak computing power.

Highlights

- World's first open petascale computing architecture, with ultradense blade computing and InfiniBand (IB) switching, and high-performance storage
- Massive scalability — optimized compute, storage, networking, and software technologies and services
- Dramatically reduced complexity — integrated connectivity and management to help reduce startup, development, and operational complexity
- Breakthrough economics — technical innovation resulting in fewer components in a tightly integrated solution
- Based on industry-standard and open-source technologies that provide a familiar, portable, and extensible application environment
- Built on eco-computing principles — delivering more computing power per watt than alternative solutions

Solution deployments

The first customer install of the Sun Constellation System is the TACC Ranger cluster, the result of a partnership between the University of Texas at Austin/Texas Advanced Computing Center (TACC) and Sun. With up to 580 peak teraFLOPS of CPU power, the Ranger cluster is one of the most powerful general-purpose computing platforms in the world. The Ranger cluster's flexibility enables users to access all or part of its computing capabilities, and will also be used in oil exploration, meteorology, materials science, and finance applications. The Sun Constellation System has seen worldwide success at institutions and companies such as TACC, Clemson University, Sandia National Laboratories, DLR-Case, Juelich, Korea Institute of Science and Technology Information (KISTI), and Center for High Performance Computing (CHPC).

Innovative components

The Sun Constellation System architecture uses state-of-the-art open-storage technologies:

- The Sun Blade 6048 modular system
- Sun datacenter switches
- Sun Open Storage

Sun Blade 6048 modular system

The Sun Blade 6048 modular system is based on Sun Blade 6000 chassis technology and is designed for high scalability and performance.

The Sun Constellation System offers a choice of AMD Opteron and Intel Xeon processors. As it offers up to four times the memory capacity of competing solutions, the Sun Constellation System is ideal for compute- and memory-intensive applications and for environments where the cluster can be simultaneously shared across multiple projects, each with their own demanding requirements.

• The Sun Blade X6275 server module

The Sun Blade X6275 server module is designed for compute-intensive applications in HPC environments. This blade server has two compute nodes that are based on the new Intel Xeon Processor 5500 series, which uses Intel QuickPath Interconnect (QPI) technology to provide more bandwidth and lower latency. The Sun Blade X6275 server module houses two IB communication chips directly on the blade itself, resulting in higher performance for applications that require a large volume of blade-to-blade communication.

• The Sun Blade X6440 server module

The Sun Blade X6440 server module has up to double the memory DIMM slots of competing blade servers, and can be configured with up to four AMD Opteron processors. This computing powerhouse can easily handle memory-intensive workloads.

Sun datacenter switches

- **Sun Blade 6048 IB QDR Switched Network Express Module (NEM)**

Ideal for HPC, the Sun Blade 6048 IB QDR Switched NEM offers 30 ports of 4x QDR and 24 ports of GbE — for unparalleled scalability, resiliency, and throughput in a highly cost-effective form factor.

- **Sun Datacenter IB Switch 648**

This switch has 648 ports of IB QDR, enabling scaling up to 5,184 server nodes. The switch and connector system support 3:1 cable aggregation, greatly reducing the number of cables required.

- **Sun Datacenter IB Switch 72**

This switch enables you to bind Sun Blade and Sun Fire servers and storage systems into a highly scalable, space-efficient, flexible, high-performance cluster. It supports scaling from as few as two to up to 576 servers.

- **Sun Datacenter IB Switch 36**

This multi purpose switch can act as a self-contained fabric solution for smaller IB clusters or as a “building block” for hierarchical fabric topologies supporting larger clusters of Sun Blade or Sun Fire servers and storage systems.

Sun Open Storage — systems without limits

The Sun Constellation System architecture uses state-of-the-art open-storage technologies:

- **Sun Fire X4540 storage server**

Delivers almost one-half petabyte of storage in a single rack, all accessible from the same IB network.

- **Sun StorageTek QFS**

Shared file system software, for maximal scalability, data management, and throughput.

- **Sun StorageTek modular library systems**

With hundreds of petabytes capacity, they provide near-line and offline storage for

massive data sets and application stacks.

- **Open-source Lustre file system**

Designed to meet the demands of the world’s largest high-performance compute clusters, the Lustre file system redefines scalability and provides groundbreaking I/O and metadata throughput.

- **Sun Storage 7000 Unified Storage Systems**

The Sun Storage 7000 Unified Storage System series helps simplify storage deployment and management with its unprecedented easy-to-use management interface, Dynamic Tracing (DTrace) analytics software, and self-healing capabilities. These features enable you to quickly find and fix issues, help minimize downtime, and can reduce the time and cost of deployment.

- **Sun Lustre Storage System**

Addresses the I/O challenges found in HPC or compute-intensive environments. Built around the world-leading Lustre parallel file system, this system provides you with an incredibly powerful, scalable, and simple-to-deploy storage solution that addresses the needs of data-intensive Linux compute clusters.

Sun Cooling Door 5200 and 5600

Efficient cooling can dramatically reduce energy costs, but only if the solution works with your existing datacenter design. That’s why Sun gives customers a choice of cooling technology — refrigerant gas or chilled water.

Sun Services makes it easy

Sun provides a range of services to support the Sun Constellation System and help enable a successful deployment, including:

- Professional services, including project management and field installation support services for ongoing maintenance.
- Sun HPC Quick Start Services make it

Learn More

To learn more about the Sun Constellation System, go to: sun.com/sunconstellationsystem.

To learn more about Sun HPC solutions, go to:

sun.com/hpc, sun.com/hpccluster, and sun.com/networking.

easy for customers to adopt, implement, and optimize HPC solutions, helping to decrease deployment time by up to 80%.

Open software environment for petascale computing

As an open HPC environment, the Sun Constellation System takes advantage of industry-leading, industry-standard, open-software components and interfaces

- Sun Grid Engine software
- Sun xVM Ops Center
- Sun HPC ClusterTools based on Open MPI
- Sun Studio 12 development environment

HPC Operating Systems from Sun

- **Sun HPC Software, Linux Edition**

Sun HPC Software, Linux Edition is an integrated, open-source software solution for Sun HPC clusters. It simplifies the deployment of HPC clusters by providing a ready-made framework of software components to use to turn a bare-metal system into a running HPC cluster.

- **Sun Solaris for HPC**

Sun HPC Software, Developer Edition for Solaris integrates three essential Sun developer tools: Sun HPC ClusterTools, Sun Grid Engine (SGE), and Sun Studio.