

Consortium of Austrian Universities Chooses Bright to Power its Supercomputer

CASE STUDY



“This cluster fulfills our special need for very high performance computing, combined with very low energy consumption.”

— Dr. Ernst Haunschmid
Technical Project Leader of VSC

Introduction

The Vienna Scientific Cluster (VSC) was designed to satisfy the demand for high performance computing from a consortium of higher education establishments in Austria, including the University of Vienna, TU Wien (TUW), the University of Natural Resources and Applied Life Sciences Vienna, the Graz University of Technology, and several universities in Austria’s southern provinces (University of Graz, University of Mining Leoben, University of Klagenfurt), and the University of Innsbruck. TU Wien has been appointed to manage and operate the cluster systems for the consortium.

Access to the VSC is granted on the basis of peer-reviewed projects that, beside scientific excellence, can demonstrate the need for extremely large computational resources.

The consortium began collaborating in 2009, installing VSC-1 with 424 nodes. VSC-1 was ranked #156 in the November 2009 issue of TOP500 Supercomputing; it was decommissioned in March 2015.

The second generation, VSC-2, was installed in 2011, with 1,314 nodes, offering 135.6 TFlop/s and was ranked #56 in the June 2011 issue of Top500 Supercomputing, and is still in operation.

The Challenge

The consortium identified the need to upgrade the supercomputer once again, to harness additional compute power, and to create an even more robust HPC environment. A key requirement for the next generation supercomputer was to focus on energy efficiency and to reduce environmental impact.

The Solution

The consortium set about designing VSC-3, which was installed in summer 2014 at the Arsenal TUW building in Austria. The new cluster has four times as much computational power thanks to Intel’s True Scale QDR80 interconnect and Intel’s Ivy Bridge-processors. It consists of 2,020 nodes; each equipped with 2 processors, and internally connected with an Intel QDR-80 dual-link high-speed InfiniBand fabric resulting in 596.01 TFlop/s (Rmax). The hardware of VSC-3 is provided by ClusterVision, using key components from Supermicro and Intel.

Currently, the VSC-3 counts as the fastest supercomputer in Austria and has been ranked as the 85th fastest supercomputer worldwide (November 2014 TOP500 list).

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Vienna Scientific Cluster



With the consortium's determination to reduce environmental impact of the cluster, the design of the new high performance computing data center is particularly interesting since it uses mineral oil for server cooling, a new energy efficient cooling mechanism developed by Green Revolution Cooling. Mineral oil is an insulator and can be used in close contact with electronics. The servers are mounted in a bath of mineral oil that absorbs the heat generated by the electronics. The oil is then pumped away to cool before being recirculated to start the cooling process over again. This method is far more energy efficient than air-cooled systems used in most data centers.

The Benefits

VSC-3 has more than four times as much computational power as its predecessor and is used for many high performance research projects, especially computer simulations of quantum mechanics.

Technology from Bright empowers the consortium to:

Lower energy consumption, to actively address VSC-3's environmental impact

Automate administrative tasks to simplify day-to-day operations

Better manage resources to enable faster and more efficient computations

Administer the cluster from a single user interface, promoting cross-university collaboration

Monitor and health check the cluster in real-time, to prevent downtime, outages, and risks to security

A Bright Solution

Installation and configuration of the entire 2,020 node cluster was done using Bright Cluster Manager®. Integral to Bright is a user friendly, graphical interface for VSC-3 systems operators to monitor, manage, operate, and scale the entire cluster from a single pane of glass.

Bright Computing also supports VSC-3's goal to improve its green credentials by introducing unprecedented energy efficiencies. Bright Cluster Manager has a power-saving feature that reduces operating costs by powering down unused nodes and system components.

"The cluster can easily be managed and monitored by Bright Cluster Manager. This new cluster gives our scientists the tools they need for years to come."

— Dr. Ernst Haunschmid
Technical Project Leader of VSC