



VIENNA  
SCIENTIFIC  
CLUSTER

# VIENNA SCIENTIFIC CLUSTER

**Austria's most powerful supercomputer  
– the engine of discovery.**

To push the boundaries of science, researchers need access to high-performance computing (HPC) resources. Supporting academics of all disciplines, the Vienna Scientific Cluster strengthened its HPC infrastructure with a next-generation supercomputer built on Lenovo ThinkSystem servers.

Lenovo





The Vienna Scientific Cluster (VSC) provides HPC resources and services to academics across Austria, supporting state-of-the-art scientific research across a wide range of disciplines—from meteorology to materials science, quantum chemistry to genetics.

The VSC is a consortium of five major universities: TU Wien (Vienna); the University of Vienna; the University of Natural Resources and Life Sciences, Vienna; the Graz University of Technology; and the University of Innsbruck. The organization is open to scientists from all higher education institutions in Austria.

Working together means that the five universities are able to procure and operate bigger, more powerful supercomputers than they could do individually. This is crucial, as demand for HPC resources has increased significantly in recent years.

It's not just user demand that is growing, but user diversity too. In the past, the vast majority of academics who applied for VSC services were traditional HPC users. These users typically ran large parallel workloads to solve complex numerical problems, predominately in fields such as computational chemistry, engineering, physics and material science—but today, these trends are changing.

The VSC is now seeing more and more requests from non-traditional users in areas such as biotechnology, social science and humanities. They want to use HPC resources to run big data analytics and machine learning jobs to advance their research, which have very different compute and storage requirements to traditional HPC workloads.

Today, the VSC supports more than 300 research projects covering everything from astrophysics and bioinformatics to molecular dynamics and linguistics.



Since it could no longer satisfy demand with its existing HPC infrastructure, the VSC launched a public tender to procure a new, higher performance, more energy-efficient supercomputer capable of supporting an ever-growing number of traditional and non-traditional use cases.

The VSC selected a joint bid from Lenovo and HPC implementation partner EDV-Design based on Lenovo ThinkSystem SD650 servers with Direct Water Cooling technology, powered by Intel® Xeon® Scalable processors. The Lenovo system delivered the best price-performance ratio and the highest energy efficiency of all the solutions considered. The built-in water-cooling technology will remove approximately 90% of the heat from the system, dramatically reducing the need for air cooling by fans, which will cut energy costs.

Working with EDV-Design, the VSC implemented a cluster comprised of 792 ThinkSystem SD650 nodes featuring 37,920 Intel® Xeon® Platinum processor cores. The servers are connected by 100 GB/sec Intel Omni-Path Architecture, a high-speed interconnect that increases application performance, improves load balancing and maximizes scalability. The cluster is connected to a storage system that uses IBM Spectrum Scale and consists of Lenovo ThinkSystem SR650 servers, Lenovo ThinkSystem DE6000H hybrid storage arrays and IBM flash storage.

The new Lenovo cluster, named VSC-4, became the first supercomputer in Austria to break the petaflop (PFLOP) barrier, achieving a peak performance of 3.7 PFLOPS (2.7 PFLOPS in continuous operation) as measured on the Linpack benchmark. It is the country's largest HPC installation and ranks 105 on the June 2020 TOP500 list of the world's most powerful supercomputers.

Professor Herbert Störi, Scientific Project Leader at the VSC, remarks: "Performance and throughput are excellent, which puts us in a strong position to support big data and analytics workloads."



“VSC-4 is four times more powerful than its predecessor. It’s a truly world-class supercomputer that will be at the heart of the Austrian research community for years to come.”

Like its predecessors, VSC-4 will be used to support a huge range of research projects—from predicting the impact of climate change on rivers and flood areas to help prepare for changing weather patterns to understanding how certain drugs react with proteins in the human body to improve medicine development. As it comes online, VSC-4 is already supporting more than 40 research groups.

The feedback that the VSC has received so far is extremely positive. Some users have reported that certain jobs are running much faster than on the old cluster. It’s still early days, but interest in VSC-4 is very high and researchers are excited to move their workloads over to the new system.

Based on the latest Lenovo and Intel technology, VSC-4 delivers a significant improvement on its predecessors. This will enable researchers to complete more jobs faster, shortening time to insight.

Professor Störi concludes: “We’re delighted with our new Lenovo cluster. It ticks all the boxes in terms of performance, energy efficiency, system stability and manageability. We’re confident that VSC-4 will help scientists of all disciplines advance their research and make new advances in their fields.”

Lenovo and Intel are working together to accelerate the convergence of HPC and AI, creating solutions of all sizes, to unlock new levels of customer insight. Through collaboration on systems and solutions, software optimizations and ecosystem enablement, our goal in the Exascale era and beyond is to speed discovery and outcomes for the world’s most challenging problems. Lenovo ThinkSystem servers, powered by Intel® Xeon® Scalable processors and Intel’s leading-edge technology for storage, memory and software, are the platform of choice for more supercomputers on the TOP500.org list of the world’s fastest systems. Together, Lenovo and Intel are providing the innovative foundation to drive science and innovation faster than ever before.

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– Professor Herbert Störi, Scientific Project Leader,  
Vienna Scientific Cluster



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