



LEIBNIZ SUPERCOMPUTING CENTRE

Driving scientific insights that could change the world.

The Leibniz Supercomputing Centre supports trailblazing scientific research with an energy-efficient, next-generation HPC cluster from Lenovo.

Lenovo





Photo credit: Veronika Hohenegger, LRZ.

The central computing center for Munich's universities, the Leibniz Supercomputing Centre (LRZ) is one of the largest academic data centers in Europe. LRZ provides world-class HPC resources to the scientific community, supporting ground-breaking research into everything from cosmology to medicine.

HPC is a cornerstone of modern academic research. It enables scientists to process and analyze huge data sets, and to build and test models of complex phenomena to gain new insights into the world around us.

Prof. Dr. Dieter Kranzlmüller, Chair of the Board of Directors at LRZ, begins: "We are very proud to support research that has a direct impact on people's lives. For example, we work with a team of hydrologists and hydrometeorologists who are using flood simulation models to improve forecasting and warning systems, which has the potential to save lives and property in the event of heavy rainfall."

LRZ's existing HPC cluster, SuperMUC, was the most powerful in Europe. But with more and more researchers running data-intensive simulation and modeling workloads, LRZ needed even more computational power.

“To support truly cutting-edge research, we need cutting-edge HPC capabilities,” says Prof. Dr. Dieter Kranzlmüller. “So, we decided to invest in an all-new petascale system from Lenovo.”

SuperMUC-NG (which stands for ‘next generation’) is the third phase of the SuperMUC series. As with previous generations, LRZ contracted Lenovo to design and build the new system, which is specifically designed to handle and visualize enormous amounts of big data.

Prof. Dr. Dieter Kranzlmüller says: “We really value our partnership with Lenovo, which is one founded on mutual trust. Our experience with Lenovo on the previous two SuperMUC clusters was very positive and our collaboration on SuperMUC-NG has been another great success. Lenovo took a holistic approach to the design to ensure the cluster met all of our technical requirements, and integrated with our other infrastructure and data center equipment.”

The SuperMUC-NG cluster is based on high-density Lenovo ThinkSystem SD650 servers and made up of 6,480 Intel® Xeon® Scalable processors with 311,000 cores, which will deliver a peak performance of 26.7 petaFLOPS – a four-fold increase in computing power. The cluster has 700 TB of memory, 70 PB of disk storage and contains over 60km of cabling.

Like its predecessors, SuperMUC-NG is an extremely energy-efficient machine. The compute nodes are equipped with Direct to Node (DTN) warm-water cooling, which uses an inlet water temperature of 45°C to extract heat from the cluster. The DTN cooling is part of Lenovo Neptune™ liquid cooling technologies. The warm discharge water from the racks is run through adsorption chillers that use evaporation and condensation to turn the warm water back into cold water, which is recirculated through the water loop.



Prof. Dr. Dieter Kranzlmüller explains: “Water conducts heat much more efficiently than air, so we can remove more heat from the system using water than is possible using fans. We expect the new cooling system to reduce energy costs by 45% and save us several millions of Euros over the next five years. We can then reinvest all the money we save into our services.”

Today, LRZ runs 750 applications on the SuperMUC-NG cluster, supporting the work of more than 2,000 scientists. For the first time, researchers will be able to access HPC resources from anywhere, at any time via the cloud. This self-service model gives scientists greater control and flexibility over how and when they use HPC to support their research.

Prof. Dr. Dieter Kranzlmüller says: “The increased performance and capabilities of SuperMUC-NG means that scientists can process more data, faster. They are also now able to create models of higher resolution and with higher granularity, helping them to deepen their understanding of the phenomena they’re studying.”

He concludes: “Researchers will now be able to tackle more complex problems. We have astrophysicists grappling with big questions like ‘How did the universe come to exist?’ and environmental scientists investigating climate change. With SuperMUC-NG underpinning their research, they might just discover the answers.”

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– Prof. Dr. Dieter Kranzlmüller, Chair of the Board of Directors, Leibniz Supercomputing Centre

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Solution components

Hardware

Lenovo ThinkSystem SD650 with
Intel® Xeon® Scalable processor
family

Software

SUSE Linux Enterprise Server

Services

Lenovo Professional Services

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**—Prof. Dr. Dieter Kranzlmüller, Chair of the Board of Directors,
Leibniz Supercomputing Centre**

As scientific research advances, the need for computation power increases. With a new HPC cluster based on Lenovo ThinkSystem SD650 servers with Lenovo Neptune™ liquid cooling technologies and Intel® Xeon® Scalable processors, the Leibniz Supercomputing Center is supporting ground-breaking new research.

