

Press Release

A pioneering role in supercomputing

More computing power for Swiss research

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Europe's most powerful supercomputer Piz Daint is being upgraded, a move that is expected to at least double its computing power. ETH Zurich is investing around CHF 40 million to allow researchers to perform simulations, data analyses and visualisations even more efficiently in the future.

With a peak performance in excess of 7 petaflops, Piz Daint is currently Europe's most powerful supercomputer. Now, it is to benefit from new hardware that will make it even more powerful. This is of vital importance both for high-resolution simulations and for the field of data science, which requires the analysis of enormous volumes of data, and which ETH Zurich is establishing as a research priority. Today, materials science, geophysics, life sciences and climate sciences all use data- and CPU-intensive simulations. With the new hardware, researchers will be able to perform these simulations more realistically and more efficiently. In the future, Piz Daint will also provide data-analysis support for major scientific experiments that are already under way, such as the Large Hadron Collider at Cern.

With the upgrade of Piz Daint, a Cray XC30 supercomputer, the ETH-affiliated Swiss National Supercomputing Centre (CSCS) will ensure that its infrastructure continues to meet the increasing requirements of high-performance computing (HPC) through to the end of the decade.

Boosting power with new compute nodes

During the upgrade the processors (CPU) and accelerators (GPU) will be updated and the system will be combined with the Piz Dora supercomputer, which also resides at CSCS, in order to form a single system. The new system will then adopt the name Piz Daint. It will thus provide users with two types of compute nodes: hybrid CPU-GPU and CPU-only nodes. In addition, it will incorporate Cray's DataWarp technology. DataWarp's so-called Burst Buffer mode quadruples the effective bandwidth for long-term storage; in other words, data is input to and output from storage far more quickly. It therefore paves the way for analysing millions of small, unstructured files. As a result, Piz Daint will then be

able to transfer initial results to a specialised area of the supercomputer for analysis while calculations are still under way.

“Although slightly reduced in physical size, Piz Daint will become considerably more powerful as a result of the upgrade, particularly because we will be able to significantly increase bandwidth in the most important areas,” says CSCS Director Thomas Schulthess. “Piz Daint will remain an energy-efficient, balanced system, but will now offer increased flexibility.” In other words, the system will allow simulations or data analyses to be scaled to a few nodes or thousands of nodes.

Data science is the future

The Piz Daint upgrade is scheduled for the last quarter of this year. ETH Zurich will invest around CHF 40 million, which the computing centre was awarded by the ETH Board as part of its dispatch on the promotion of education, research and innovation (ERI Dispatch). “Data is a commodity of the future, and data science is the tool that allows us to exploit this commodity for the benefit of society. That’s why it is important to invest in the best possible infrastructure at an early stage,” says Professor Ulrich Weidmann, ETH Vice President for Human Resources and Infrastructure. The upgrade is intended to bolster Switzerland’s position as a centre for scientific research and to safeguard its pioneering role in European supercomputing.

Close cooperation between science and industry

Cooperation on future development of supercomputing platforms is regulated by existing contracts between ETH Zurich and Cray and NVIDIA. The Piz Daint upgrade also falls within this context. Specifically, the Piz Daint system will see an upgrade of its Intel CPUs from Sandy Bridge to Haswell architecture, and an upgrade of its NVIDIA Tesla graphics processors (GPUs) from Kepler to the next-generation Pascal architecture.

“One of the key elements of the partnership between Cray and CSCS was the close cooperation with users to develop innovative computing environments such as Piz Daint,” said Peter Ungaro, Cray President and CEO. “Together, on the basis of a clearly defined development plan, we will provide users from science and industry with a solution that reflects our shared vision of a unified environment to support scientific applications and data analyses.”

“We are pleased that CSCS has opted for Pascal-based Tesla graphics processors, which will speed up critical research carried out by a great number of scientists,” said Ian Buck, Vice President of Accelerated Computing at NVIDIA. “They are using Piz Daint to tackle some of the most important challenges of our time. Pascal-based GPUs offer a huge leap forward in application performance, which will allow CSCS to push the limits of scientific discovery.”

Further Information

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About CSCS, the Swiss National Supercomputing Centre

Founded in 1991, CSCS develops and provides the key supercomputing capabilities required to solve challenging problems in science and/or society. The centre enables world-class research with a scientific user lab that is available to domestic and international researchers through a transparent, peer-reviewed allocation process. CSCS's resources are open to academia, and are available as well to users from industry and the business sector. The centre is operated by ETH Zurich and is located in Lugano.