



CSCS

Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

FACT SHEET

CSCS - driving innovation in computational research in Switzerland

CSCS provides the supercomputers and expertise that help keep Swiss science at the forefront of developments worldwide. Supercomputers are the tools of today's inventors. With them, researchers can demonstrate science that was never possible with theory and experimentation alone. Industry and society can benefit from these discoveries in equal measure.

CSCS (Swiss National Supercomputing Centre) is the partner for Swiss universities and research institutions in the field of high-performance computing (HPC). Its basic task is to provide scientists with the computing infrastructure and expertise they need for their research. To do this, CSCS operates the very latest supercomputers and has an international 50-person team to offer its users all the expertise and efficient support they need with HPC. Although CSCS is essentially a service organisation for academic and government researchers (i.e. a User Lab), it is also available to users from business and industry.

Swiss experts in supercomputing

HPC has gained enormously in importance over the last ten years. Whether it is in physics, materials science, health science, chemistry, biology, and increasingly, also in the humanities and social sciences and economics, HPC has become an essential enabling technology that supplements theory and experimentation.

As a centre that specialises in supercomputing, CSCS not only supports scientists on everything to do with HPC, it also brings together researchers from different institutions and encourages research partnerships. In order to be able to influence the latest developments in HPC and take part in them, CSCS works with the world's leading computing centres and hardware manufacturers. This development, together with the High-Performance Computing and Networking (HPCN) strategy that is being supported by the Swiss government, means that CSCS is now the driving force behind innovation in computational research in Switzerland: the very latest computer architecture helps to ensure that users' codes run quickly so they can focus more on their scientific results.

The Università della Svizzera italiana in Lugano (USI) has also responded to the new developments by establishing an Institute for Computational Science of international standing: some very famous scientists have been appointed to the seven professorships. Being so well-established in the field of computational science, CSCS and USI have launched the HP2C project as part of the HPCN strategy (www.hp2c.ch).

With HP2C, the Swiss initiative for High-Performance and High-Productivity Computing, CSCS has succeeded in bringing together Swiss researchers, IT specialists, mathematicians and hardware manufacturers. The purpose of this interdisciplinary cooperation is to adapt the algorithms that have been used in the past for modelling and resolving complex scientific questions for use with the computer architectures of the future. Only by doing this will it be possible to use the latest computers efficiently, thereby keeping the ever-rising energy consumption of high-performance computers in check. Thanks to this project, CSCS can help Swiss researchers to gain a world-class advantage.

At the service of society

The methods and algorithms that have been developed by computational scientists are of great benefit to the pharmaceutical industry in developing new drugs (by simulating complex molecules and chemical reactions) and also in the energy sector in producing efficient solar cells. They help economists to understand the markets and assess the scale of economic crises. Climate researchers use HPC in their climate forecasts, and MeteoSchweiz works out its daily weather forecasts on CSCS computers. Weather forecasts not only tell the man in the street about the weather and possible natural hazards, but they also provide essential information for air traffic control services and also disaster mitigation (for example, if there is a radioactive leak at a nuclear power station and people need to assess how far the radioactive cloud will spread).



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In order to be able to explain what happens when elementary particles collide at virtually the speed of light in the Large Hadron Collider (LHC) at CERN, there is a global network of supercomputers. CSCS runs one of those. Large systems such as the planned X-ray laser SwissFEL at the Paul Scherrer Institute can also benefit from the expertise and infrastructure of CSCS, since they cannot operate without high-performance computers. The same is true of big European Union projects (FET Flagship Projects) such as Human Brain, Guardian Angel or FuturICT. Swiss scientists are playing an important role in these and therefore help bring Switzerland's investment in the EU back to Switzerland.

CSCS combines resources

High-performance computers have become key technology over the last 20 years. CSCS, which is affiliated with ETH Zurich, consolidates computer resources in one place and makes computing for scientific purposes equally accessible to all universities. To accomplish this, it has an annual budget of about 40 million francs, similar to that of other small academic and research organisations in Switzerland.

The innovative new building in Lugano will ensure that the supercomputers can continue to be operated flexibly and efficiently over the next 40 years, guaranteeing that the high-quality service provided by CSCS to its users will be maintained. In this way, the Supercomputing Centre can support Switzerland's position as a centre for research and business in the field of supercomputing in an optimal manner.