TALKS WITH
DR. ROLF RABENSEIFNER

SUPERCOMPUTING, LOOKING BACK AND AHEAD

You have been in HPC for 25 years? Why did you stick to this domain?

My work was rich in variety. On the one hand, I was active in research and, on the other hand, in service through teaching courses. I was given a permanent employment contract relatively early in my career, and later I also had the opportunity to work externally on a freelance basis.

It is often more efficient if the trainer travels, and thus many course participants are already on-site.

Over the years, this has created a nice network with Dresden, Jülich, Garching, Hamburg, CSCS and ETH in Switzerland, Leuven in Belgium, Amsterdam, Vienna, Mainz, Frankfurt, and Stuttgart as the centre. It was also exciting to collaborate with colleagues from other centres for our tutorials, first at Euro-PAR and then at the SC conferences and later at ISC.

It was more work, but also interesting travel and not just permanent unpaid overtime. I had a lot of creative freedom and enjoyed my work.

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>
> **Dr. Rolf Rabenseifner**

Do you have any advice for people starting in HPC now?

This mix of research and training, of national, European, and international collaboration, is important. Not only to enjoy the work but also to develop it long-term. It doesn't happen overnight, so when opportunities arise, it's important to take them. Especially in the HPC area, projects often focus on consulting and training services. Looking back, I see how important it was that my teaching career was based on a long history of my own research and paper publication, but also on my active participation in the development of the MPI standard. My advice is that young people should never be limited to services. New service development should be based on and integrated with their significant research efforts.

Is this also related to the cooperation with funding agencies?

Yes, this mix of research and services should always be demanded by our HPC centres and their funding organizations, not prevented.
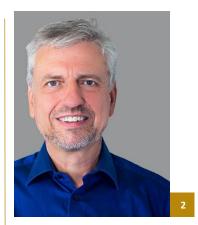
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In the past years, several European projects have reflected how the government wants to approach HPC. First, there was PRACE, DECI, and now EuroCC. How do you see this evolve in the future?

When it comes to training, it's about responsibility for these services. This is not a short-term thing, and the responsibility goes both ways, for the trainers & organizers **and** for the funders. With the transition from PRACE to EuroCC, we observed that long-term structures were broken up. Reinventing the wheel can lead to a better outcome but should always be done with caution. It is very understandable that experienced trainers simply look for a secure job outside of the training area instead of being some months without a salary. Those gaps severely harm knowledge transfer.

What's your view on the evolution of HPC (in Europe, in the world, HPC applications) and how will it evolve in the future?

In the last 25 years, a lot of additional complexity has been added, just think about the development of multi-core CPUs and GPUs. On the software side, additional standards have been set, or existing ones have been significantly enhanced. With AI, Deep Learning, and Big Data, completely new ways of thinking in HPC have been added. Quantum computing will try to significantly reduce extreme power consumption for some application scenarios.

Our HPC systems are currently still extreme power hogs compared to the elegance of the "construction" of a human brain. At the same time, as the price of a FLOP (floating point operation) is getting lower and lower, the use of simulation is becoming more profitable in larger and larger application areas. As a result, more and more people are coming into contact with HPC, which understandably also necessitates an expansion of the scope of training. It remains very exciting.

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Dr. Rolf Rabenseifner

SUPERCOMPUTING IN EUROPE
By **EuroCC Belgium**

EuroHPC JU
Currently, High Performance Computing infrastructure and services in Europe are partly funded by European High-Performance Computing Joint Undertaking (EuroHPC JU for short).

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This is a Horizon 2020 initiative that started in 2018 and will end in 2026. The mission of this project, a collaboration between the European Union, member states and the private sector, is to create a world-class ecosystem for HPC in Europe. The EuroCC is a subproject that seeks to establish a network of national competence centers in each of the participating countries.
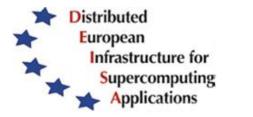
IMAGE CAPTION
1. Dr. Rolf Rabenseifner at the colloquium organised by HLRS in his honour in May 2022
2. Dr. Rolf Rabenseifner
3. Logo of Euro HPC Joint Undertaking

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DEISA

EuroHPC JU is the latest and most ambitious project launched by the EU to be competitive with the United States, China and Japan in terms of supercomputing capabilities. At the start of the new millennium, the European Union realized the strategic importance of high-performance infrastructure and launched the Distributed European Infrastructure for Supercomputing Applications (DEISA[1]) in May 2004.

This was an FP6-infrastructures program. A consortium of leading supercomputer centers coordinated efforts to offer terascale computing capabilities. In 2004, the aggregated power of this infrastructure was a little under 30 TeraFLOPs. The individual supercomputer centers would be connected by a dedicated high-speed network to offer a virtual compute center. Grid technology made this transparent to the user to some degree. Centers in France, Spain, Italy, the Netherlands, Germany the United Kingdom and Finland participated.

Although this was primarily an infrastructure program, funding was also provided for research related to this topic. The project ran for four years with a budget of a little over 24 million euro. Further funding was provided in FP7 for the DEISA2[1] project that ran till 2011 and had a total budget 18.6 million euro. Swiss, Russian and Swedish centers were associated partners.

PRACE

After DEISA, Europe got serious about supercomputing and launched the Partnership for Advanced Computing in Europe (PRACE). The scope of PRACE was much broader than that of DEISA. Not only did it provide access to world class supercomputing infrastructure for researchers in academia but it also reached out to industry via the SME HPC Adoption Programme in Europe (SHAPE) program.

Software development and optimization work packages were part of the project, as well as training and outreach. The first implementation phase started in 2010, the sixth and last implementation phase ends in December 2022. Twenty-five countries contributed to PRACE, mostly the hosting members France, Germany, Italy, Spain and Switzerland. The latter host the Tier-0 systems that provide users access to supercomputers with capacities of the order of 10 petaFLOPs. The total budget for the six implementation phases was 150 million euro. Fortunately, Europe is considering to extend the funding for PRACE training by a year to facilitate a smooth transition to the EuroCC 2.0 project.

EuroHPC JU is funding Europe's pre-exascale systems of which LUMI in Finland is the first to be operational. Ultimately, Europe will have its own exascale supercomputers, as well as the technical know-how for them to be manufactured in Europe, thanks to, e.g., the European Processor Initiative. Similar to PRACE, EuroHPC JU places a strong emphasis on HPC-related services and the onboarding of SMEs.

IMAGE CAPTION

4. Logo DEISA - Distributed European Infrastructure for Supercomputing Applications
5. Logo PRACE - Partnership for Advanced Computing in Europe
6. LUMI Europe's most powerful pre-exascale supercomputer