EU supports next generation turbocharged supercomputers

The DEEP projects delivered great results in the area of High-Performance Computing (HPC). Project coordinator Estela Suarez told us how continuous EU funding made this possible.

Forschungszentrum Jülich / Sascha Kreklau - Estela Suarez Forschungszentrum Jülich / Sascha Kreklau

High-Performance Computing has become a key cornerstone for a more and more digitalised European society. Supercomputers find their use in various fields such as the exploration of the human brain or climate change research.

The DEEP and DEEP-ER projects, funded by the EU with more than EUR 14.3 million, brought together 20 partners from ten European countries to develop a new 'turbocharged' supercomputer concept.

In this short interview, project coordinator Estela Suarez describes the use of supercomputers for the European society and reveals the importance of EU funding for her projects.

Estela, what is the main added value of EU funding to your project?

The research infrastructure provided by the EU is key for the success of ambitious research endeavours like the DEEP projects. It facilitates bringing together people and institutions from all over Europe, combining the skills required to create innovation. Without the FP7 and H2020 frameworks, large, multinational and multidisciplinary consortia as the ones in the DEEP and DEEP-ER projects would be impossible. Also the scientific guidance given by the experts that the European Commission selects to review the projects is extremely valuable. They provided us with advice to achieve the maximum in the DEEP project, and to further improve our approach in the follow-up DEEP-ER.

Research in High-Performance Computing is a long lasting process. How important was the sustained EU funding for your research over several projects?

The DEEP projects have taken a holistic approach to develop next generation supercomputers. Future HPC systems face a number of challenges and we have always been looking at all levels: the hardware, the software, and the scientific applications, paying special attention at how these are interrelated – we call this our co-design approach. Still, in a research project that only lasts for three years, you must focus on a limited amount of research topics, and set up objectives which are achievable in the reduced time. Only a long-term investment enables fully realising solutions to the Exascale challenges. This is exactly what we are able to achieve over our three projects. Our first project (DEEP) focused on validating our innovative computer architecture, by demonstrating it in a prototype. In the second project, DEEP-ER, we further developed its software environment with advanced I/O and resiliency capabilities. Now, in the recently started DEEP-EST project, we will extend our concept towards a Modular Supercomputing Architecture, fulfilling the requirements of both computational intensive codes, and big data analytics applications.

How can European citizens benefit from the supercomputers your projects work on?

High performance computing has already today a huge impact on people’s daily life. It helps us for instance better understanding climate change, or developing personalised medicine. Researchers from various scientific domains keep telling us that with more powerful supercomputers they could solve even more complex scientific problems. They could for example giver better predictions for earthquakes, or understand why brain illnesses as Alzheimer appear, which is obviously a crucial step towards its healing.

These are just some examples that show how HPC brings science forward. To keep it this way, we have to address the scientists’ needs and start already now developing future, even better supercomputers. Building these next-generation HPC systems is a highly complex endeavour, and many challenges are yet to be solved. The larger the supercomputers get, the more energy they need, the more complex they are to program and maintain, and the more likely they are to crash. This is where research initiatives such as our DEEP projects come into play. In the series of by now three DEEP projects we tackle all the challenges mentioned. For example, in our second project DEEP-ER, we developed techniques to enable applications surviving hardware failures with minimal time loss, and integrated new memory technologies that drastically increase their I/O and overall performance. Furthermore, we have modernised scientific applications preparing them to run on Exascale computers, where they will be able to achieve results for the benefit of science and society.

More information

- Supercomputers promise to tackle pressing global issues tells the story of the successful project in more detail;
- The website of the DEEP projects contains all the information about the project and its current actions.

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