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JSC has Major Role in Second Round of Centres of Excellence

Of the ten new or extended Centres of Excellence (CoE) approved within the EU Horizon2020 e-infrastructures Programme for a second three-year funding phase last autumn, JSC will participate in four projects: POP2 – Performance Optimisation and Productivity; EoCoE-II – the Energy-oriented Centre of Excellence; MaX2 – Materials design at the eXascale and FocusCoE, a coordinated support action (CSA) for all CoEs. JSC is also still active within E-CAM – an E-infrastructure for Software, Training and Consultancy in Simulation and Modelling, which still has two years to run out of its five-year duration. In this second round, CoEs will concentrate their efforts on enabling key community codes to exploit forthcoming (pre-)exascale computing facilities to be commissioned by EuroHPC.

E-CAM's goal is to establish a link between industry and the scientific community in the fields of soft matter, materials science, electronic structure, and biophysics. Training events on modern software development are organized both within E-CAM and together with other CoEs and community groups to transfer knowledge of modern software development to the scientific and industrial communities.

After a successful first phase of the POP project, which performed over 160 performance assessment services for customers, the project team of **POP2** will continue to provide free performance optimization services for academic and industrial codes free of charge to organizations in the EU. It now has two additional expert groups at UVSQ, France, and IT4Innovations, Czech Republic, and the new Co-design Data Repository. (URL: https://pop-coe.eu/)

The enlarged **EoCoE-II** consortium will channel its expertise and experience into enabling several flagship applications in the renewable energy sectors of energy meteorology, solar, wind and hydro-power, and fusion energy to run at scale.

A new aspect in the **MaX2** project will be to address data provenance and reproducibility challenges, for which it will leverage the upcoming Fenix infrastructure.

Finally, the mission of the **FocusCoE** is to ensure that extreme scale applications result in tangible benefits for addressing scientific, industrial, or societal challenges. Here, JSC will oversee the organization of transversal training opportunities targeted at CoEs and their communities. All four new projects started either last December or this January.

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Guest Student Programme 2019

During summer 2019, JSC will again be offering a guest student programme. It is supported by the Centre Européen de Calcul Atomique et Moléculaire (CECAM) and IBM. Within this programme, students with a bachelor's degree in natural sciences, engineering, computer science, or mathematics will have the opportunity to familiarize themselves with different aspects of scientific computing. Together with local scientists, the participants will work on various current topics in research and development. Depending on previous knowledge and on the participant's interest, the assignment can be chosen from different areas. These fields include mathematics, physics, chemistry, neuroscience, software development tools, visualization, distributed computing, operating systems, and communication. Special emphasis is given to the use of supercomputers.

The participants are expected to have knowledge of and experience in the computer-oriented branches of their subjects. Students should already have completed their bachelor's degree but have not yet finished their master's. Additionally, a letter of recommendation from a university lecturer or professor is required for application.

The programme will last ten weeks from 5 August to 11 October 2019. Students are encouraged to apply for the programme online. The closing date for applications is 24 March 2019. Further information can be found on the web at http://www.fz-juelich.de/ias/jsc/gsp/.

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EPI Project: Building European Processor Technologies

Very few countries and regions in the world are currently able to deliver the high-end processor technologies that drive our digital era. As things stand today, Europe is not one of these. This is a significant risk for Europe's future as such technologies are export-controlled, i.e. access to these technologies today strongly depends on the policies of governments outside of Europe.

To change this scenario, the European Commission is setting up a strategy to support the development of European processor technologies through the European Processor Initiative (EPI). EPI is based on a long-term Framework Partnership Agreement (FPA) between the European Commission and 24 partner institutions under the leadership of Bull/ATOS. The first phase of the EPI project started on 1 December 2018 and will run for three years with a budget of € 80 million.

The EPI project aims at creating a new family of high-performance processor technologies where export control remains in Europe. In the first three years, a processor with general purpose cores and accelerator units will be developed and implemented. A first-generation chip is planned to be taped out and validated in 2020. The EPI processors will be designed targeting high-performance computing (HPC) but keeping much larger market sectors in mind, including automotive, cryptography, artificial intelligence, and trusted IT infrastructures, amongst others.

Two institutes from Forschungszentrum Jülich are participating in EPI, bringing complementary contributions to the table: while JSC is leading the co-design approach, which will ensure that the requirements of the final users are met, ZEA-2 (Electronic Systems) is participating in the formal verification and validation of the constructed general-purpose processing units.

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JSC Extends Efforts to Bring HPC to Energy Systems Modelling: METIS Project

Q4 2018 saw the kick-off of the METIS project, in which the institutes IEK-3 (Electrochemical Process Engineering) and JSC of Forschungszentrum Jülich are cooperating with RWTH Aachen University and the University of Erlangen-Nürnberg in order to extend the potential of energy systems modelling. An increase in the level of detail and complexity in such calculations is crucial for a successful and economically sound transition to a sustainable energy system. Funded by the Federal Ministry for Economic Affairs and Energy (BMWi) for three years, the three partners are taking on the challenge and combining their expertise for advances in an area of major contemporary importance.

JSC will assist in tailoring numerical methods for HPC to meet the needs of more and more elaborate calculations. The project adds to JSC's existing contributions in this field, namely ongoing participation in the project BEAM-ME, also funded by BMWi, and successful cooperation with TenneT, one of the four transmission system operators in Germany.

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DeepRain: Machine Learning Methods for Precipitation Forecasts

The three-year BMBF-funded joint project DeepRain is coordinated by JSC and aims to apply modern methods of machine learning to improve precipitation forecasts in Germany. Precise predictions of rain and snow with a reliable indication of the expected amount of precipitation are still an extreme challenge for weather modelling. Through the use of radar data, high-resolution topographic data, and ensemble forecast data, researchers at JSC and DWD, in collaboration with the Universities of Osnabrück and Bonn and Jacobs University in Bremen, plan to achieve significant improvements here. The DeepRain project started in October 2018 with a kick-off meeting at JSC.

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Graphics Package IDL: Frozen state

The IDL graphics package has been in use at Forschungszentrum Jülich for more than 20 years. The licences required for use and the associated annual update costs have been financed in recent years by the institutes where IDL's main users are located. JSC has offered IDL on the supercomputers and shared the costs proportionately. However, use of the software has been declining steadily. Existing applications have been increasingly ported to other software platforms, e.g. Python. As a result of this development, JSC, together with other institutes bearing the costs, has decided to cease purchasing updates.

IDL will be frozen in its current state, but as long as it is technically possible, it will be offered in this state on the supercomputers JURECA and JUWELS at JSC.

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Awards for Bachelor's and Master's Students

On 14 December 2018, four students from Forschungszentrum Jülich received the Ehrenplakette award from Aachen University of Applied Sciences (FH Aachen). In a ceremony at Aachen's historic town hall, Prof. Baumann, rector of FH Aachen, honoured Steffen Domke (IEK-8), Christian Peters (IKP-1), and Niklas Selke (IEK-5) as the best graduates from the bachelor's course Scientific Programming, and Christian Schiffer (INM-1) as the best graduate from the master's course Technomathematics.

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