New Usage Model on JSC Supercomputers

JSC will introduce a new usage model on the hosted supercomputer systems starting in November. The new model overcomes well-known obstacles in using the systems, such as the handling of several user accounts and the sharing of data between project members and even between different projects.

To achieve these goals, the new model is user-centred, i.e. each user will have only one account on the systems, via which all assigned projects can be accessed. Particular attention has been paid to data handling: user space is separated from project space, thus allowing all project members to work on the same data. An important step for future needs is also the introduction of data projects. A data project is not connected to a CPU budget like the known compute projects, but instead provides access to further storage layers. Data projects are independent of compute projects and allow data sharing between communities using different compute projects.

To get this model up and running, all users need a new single account on the systems. A significant amount of data movement is also required. These steps have already been started transparently for the users. Nevertheless, adaptions on the user side cannot be fully avoided. Therefore, it will be important for users to read our documentation at http://fz-juelich.de/ias/jsc/usage-model. The maintenance to apply these changes will be announced separately.

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Replacement of Cables in the JURECA Booster Module in Autumn

In autumn 2017, the JURECA Booster Module was installed with 1,640 compute nodes based on Intel Xeon Phi processors and an Intel Omni-Path Architecture (OPA) high-speed interconnect. The OPA interconnect links over longer distances are realized with active optical cables. Since the start of the system, this cable type has exhibited a high failure rate that did not decrease over the last few months as anticipated. This problem is now understood to be a quality problem in the cables supply chain. In the meantime, Intel has stopped shipping cables from this supplier.

Unfortunately, only a swift replacement of all optical cables can help to bring the failure rates to an acceptable level in the short term. These cables cannot be replaced during production without a significant risk of impacting on running workloads and the file system stability on the Booster and other systems in the JSC facility. Therefore, multi-week offline maintenance is required for this action. JSC and Intel had initially planned to perform the replacement in early autumn, starting from 7 September until mid-October. However, the new cables that were shipped to Jülich at the end of August did not pass on-site screening. In view of the very significant impact of the planned maintenance on JSC and its users, and considering the risk that the functionality of the new optical cables may be affected, it was decided to postpone the cable replacement.

JSC expects the maintenance to take place in October or November. The precise dates will be announced to all affected users as early as possible. JSC remains committed to keeping the impact of this long maintenance on its user base as low as possible.

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JSC Enables TSO Tennet to Push Power Grid Modelling to New Limits

In cooperation with Tennet, one of the four transmission system operators (TSO) in charge of Germany's electricity transmission grids, experts from the cross-sectional team Application Optimisation at JSC conceptually designed a new parallel computing setup for the simulation of future grid adaptations. Over three years, the project included an evaluation of available options, a detailed proposal for a concrete setup, collaboration with an IT service provider to put this setup in place, and extensive support and training to initialize the every-day workflow. Furthermore, an individual software framework was developed at JSC which is tailored to the specific workflow of Tennet's simulation teams. As a result, Tennet staff can now use a

heterogeneous cluster architecture from a common interface that provides transparent access to all necessary functions and data, with the complexity of the parallel architecture being hidden. Most importantly, the overall workflow was sped up substantially – up to a factor of 30 for certain tasks. The work was contracted by Tennet and is one of several activities at JSC in the area of energy systems modelling, which also includes scientific projects with partners inside and outside of Jülich, which are supported by national funding. For more information, visit http://fz-juelich.de/goto?id=2352208.

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EXA2PRO: Programming Environments for Exascale

Insulating application developers from details of the underlying hardware architecture is expected to become more and more challenging towards exascale. Parallelism will increase but will be organized in different ways, i.e. different number of CPU cores and various vector and SIMD instruction sets with different lengths. Tight limits on the power budget will favour the use of compute accelerators like GPUs. Reconfigurable devices like FPGAs could also play an important role here. The new three-year EU-funded EXA2PRO project addresses this challenge by developing a programming environment with a particular focus on the productivity of application developers.

EXA2PRO's approach is based on the use of skeletons and multi-variant components. Skeletons are predefined generic program building blocks for frequently occurring computation patterns such as data-parallel map, reduce, scan, stencil etc., for which efficient platform-specific implementations may exist. Where existing skeletons do not fit, multi-variant components are foreseen as alternatives. These are abstractions of functions with multiple implementation variants. Skeletons and multi-variant components are integrated through a composition framework that interacts with a runtime system and support library. The latter will support different hardware back-ends ranging from standard CPUs over GPUs to FPGAs.

The project consortium comprises universities and research labs from France, Germany, Greece, and Sweden as well as Maxeler Technologies with sites in the UK and the Netherlands. EXA2PRO is coordinated by the Institute of Communications and Computer Systems in Athens. For further information, visit https://exa2pro.eu.

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First HBP Colloquium in Jülich on 4 October

To build a collaborative ICT-based scientific research infrastructure to allow researchers across Europe to advance knowledge in the fields of neuroscience, computing, and brain-related medicine is the main objective of the EU-funded Human Brain Project (HBP). The 10-year project has just completed the first funding phase and is celebrating half-time. This is a good reason to take a closer look at the successes achieved so far, but also at the challenges that still lie ahead. The colloquium will pay special attention to the German research activities within the project, highlighting Jülich contributions that integrate HBP activities in the Helmholtz Association. The first HBP Colloquium will take place on 4 October 2018 in the Lecture Theatre at Forschungszentrum Jülich and is open for participants outside the project. For further information, visit http://fz-juelich.de/hbp-colloquium.

PRACE "Summer of HPC" 2018

JSC participated in the PRACE "Summer of HPC" for the fifth time. The programme offers summer placements for undergraduate and postgraduate students at HPC centres across Europe. Twenty-three candidates were selected from a pool of highly skilled and motivated applicants from all across Europe. The successful students then participated in ongoing research projects at ten different HPC centres within the timeframe from 1 July to 31 August 2018. Travel and accommodation costs as well as a bursary were provided by PRACE to all successful applicants.

This year, Janni Harju (UK) and Wojciech Nawrocki (UK) joined JSC for the summer to gain first-hand experience in day-to-day research. After a training week for all 23 students in Edinburgh hosted by EPCC, Janni and Wojciech started their summer projects at JSC. Wojciech was supervised by Andreas Beckmann working on a generic tasking framework for fast multipole methods on GPUs, while Janni was supervised by Stefan Krieg working on lattice quantum chromodynamics.

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News from MATSE Education

On 1 September 2018, 30 new students started their bachelor's course in "Angewandte Mathematik und Informatik", formerly entitled Scientific Programming, at Aachen University of Applied Sciences (FH Aachen) in combination with a training course as a mathematical-technical software developer (MATSE) at Forschungszentrum Jülich. Of these students, 28 will conduct their practical training in various institutes at FZJ, while two students have been placed with external industrial partners. Both the vocational training and academic studies are designed to last three years in total. The curriculum and further information can be found at http://fz-juelich.de/matse.

At the end of August 2018, 30 MATSE trainees, who started their vocational training in 2015, passed their final examinations. During a ceremony on 31 August, they were warmly congratulated by Michael Arth from the Aachen Chamber of Commerce (IHK), Dr. Mathias Ertinger – head of Human Resources – and Ulrich Ivens – head of the Vocational Training Centre – both from Forschungszentrum Jülich. Five of the examinees achieved the best grade of "sehr gut", fifteen more scored the second-best grade "gut". The best result was attained by Carl Burkert (IEK-8), who achieved 97 %. Since 1964, about 1,150 trainees have successfully completed this course at JSC.

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