Cyberattack against Supercomputers

On 11 May 2020, triggered by a tip-off from a German HPC centre which had identified a successful cyberattack on its system, an initial analysis showed that JSC's supercomputers JUWELS and JURECA, as well as the JUDAC and JUSUF systems, were affected by the same attack. As an immediate measure, JSC stopped access to the systems and informed its users.

Following this, it turned out that a significant number of other German and European HPC centres were also affected and further analysis was performed in close interaction with the Gauss Centre for Supercomputing, the Gauss Alliance, and PRACE, with the involvement of the computer emergency response team DFN-CERT and the responsible authorities. It was found that the attackers have used compromised user accounts to access the systems and were able to elevate their privileges. The analysis revealed no indications that the attack was targeted against a particular research community, that research data had been stolen, or that the compute capacity of JSC's systems had been abused. However, all user SSH keys stored on the file systems at JSC must be considered potentially compromised and have to be revoked.

On 4 June, JSC reopened user operation on JUWELS and JURECA. While the full compute capacity of these systems has become available again since then, additional security measures have been implemented and some restrictions apply initially. Among others, outgoing SSH connections have been blocked and users have had to upload new SSH credentials via JuDoor. The JUSUF system will be made available again soon. The data exchange system JUDAC is currently undergoing a redesign and is therefore not accessible. JSC is in close exchange with partner centres in Germany and Europe to discuss longer-term measures that improve the overall security level without hampering the usage of the systems.

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Gradual Decommissioning of the JURECA Cluster

In late autumn, the JURECA Cluster module will have reached five years of successful operation and is scheduled for decommissioning at the end of November. The technical details about the successor system, the JURECA Data Centric module, – JURECA-DC for short – will be announced soon. Due to space and power constraints, the installation of the successor system cannot be overlapped with the production of the full JURECA Cluster. Therefore, the decommissioning of the JURECA Cluster and the start of production on the JURECA DC module will take place in the following three major stages:

(1) Half of the JURECA Cluster will be shut off in the first weeks of July, tentatively scheduled for 13 July 2020. The batch partition will shrink in size. The available GPU nodes will not be affected. The large-memory partitions (nodes with 256 GB and 512 GB main memory) cannot be offered from then on. Moreover, the visualization partition including the visualization login nodes will be decommissioned at this point.

(2) The first phase of the JURECA DC module will be installed by the end of November and production will switch to the new system in early December.

(3) The second phase of the JURECA DC module will be installed in late 2020/early 2021 with scheduled availability within the first quarter of 2021.

The JURECA Booster module is not directly affected by the replacement but extended maintenance slots will be required due to the tight coupling with the JURECA Cluster.

JSC will inform all JURECA users about more details concerning time schedule, required downtimes, and migration of projects to the new system as soon as possible.

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Booster Module Completes the DEEP-EST Prototype

The hardware prototype of the DEEP-EST project was completed with the installation of the Extreme Scale Booster in mid May 2020. Based on JSC's Modular Supercomputing Architecture (MSA), the DEEP-EST prototype interconnects via a high-speed Network Federation of three compute modules: a general-purpose Cluster Module (CM), a focused Data Analytics Module (DAM), and an Extreme Scale Booster (ESB) module.

The first two modules (CM and DAM) installed at JSC back in 2019 are designed to be used for application workloads with high requirements in terms of single-thread performance and management of large data volumes. The power-efficient ESB now provides an additional 75 nodes, each hosting one Intel Xeon CPU and one NVIDIA V100 GPU, to address the needs of highly scalable codes and adapt them to the computer architectures likely to be used in the Exascale era.

Integrated by the partner MEGWARE, the full DEEP-EST system features state-of-the-art high-performance technologies for compute (CPU), acceleration (GPGPU, FPGA), memory (volatile, non-volatile), SSD storage, I/O and network fabrics to support modern HPC, Data Analytics, and AI workloads. It also utilizes MEGWARE's innovative direct liquid (warm water) cooling technology for high energy-efficiency, thus supporting the European Green Deal strategy. Technical details on the DEEP-EST system can be found at https://fz-juelich.de/ias/jsc/deep-est-system.

The DEEP-EST prototype is available to project partners and also to external users through the Early Access Program, including those performing COVID-19 related research activities.

JSC is the coordinator of the DEEP-EST project, an EU funded Horizon 2020 research project with 16 international partners, aiming at the development and demonstration of Exascale-ready hardware and software technologies. The project results will be fundamental to shaping the future of the JSC production environment. For more details on the DEEP-EST project, please visit www.deep-projects.eu.

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Next Phase of Human Brain Project Launched

The Human Brain Project (HBP) has entered into its next and final phase, which will last another three years until March 2023. Launched in 2013 as one of the first two EU-funded "FET Flagship" projects, the central goal of the HBP in this last phase will be to consolidate and further integrate the developed platforms into a coherent and sustainable research infrastructure for neuroscience and brain-inspired technology development. This digital research infrastructure, called EBRAINS, will provide researchers with tools and services for storing, processing, analysing, and sharing data, for navigating the brain in 3D brain atlases, for running closed-loop AI and robotics workflows, and for creating and simulating models of the brain.

The JSC leads the EBRAINS Computing Services work package, which operates and integrates the HPC/Cloud computing and storage services of the Fenix Infrastructure (including the JSC's new JUSUF system) with novel neuromorphic computing services. This joint infrastructure layer forms the basis of EBRAINS and enables platforms such as the Neurorobotics Platform and individual "vertical" solutions to integrate different EBRAINS services within complex workflows. Through its SimLab Neuroscience, the JSC also plays a key role in the further development and integration of the neuroscience simulation engines Arbor, NEST, and The Virtual Brain, as well as their coupling for the co-simulation of multiscale brain models, within the EBRAINS Modelling Services work package. The JSC is also engaged in the support of EBRAINS users through the HBP's High-Level Support Team, and in efforts to ensure that EBRAINS will be continued as a sustainable European research infrastructure even beyond the end of the HBP.

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JSC@ISC2020

For the first time in the history of the International Supercomputing Conference (ISC), this year's ISC will be held as a pure online event due to the coronavirus pandemic. It is called "ISC 2020 Digital" and will take place from 22 to 25 June 2020. It is free of charge and all talks are exclusively available for registered participants for 14 days following the online event. After that they will be open for the general public to access. To register online for ISC2020 Digital and for more information about the agenda, please see https://2020.isc-program.com.

JSC staff will contribute to this event in numerous talks and workshops, including the following: Andreas Lintermann is the co-organizer of the "First International Workshop on the Application of Machine Learning Techniques to Computational Fluid Dynamics Simulations and Analysis", Alan O'Cais is a speaker in the "Second Workshop on HPC Education and Training for Emerging Technologies". Kristel Michielsen will give the talk "Quantum Classical Hybrid Computing Models in Modular HPC Systems" in the focus session "New Info from Quantum Computing in Europe", and Laura Morgenstern and Ivo Kabadshow will present the poster "GPU-Tasking à la Carte? Eventify Meets GPUs" together with Matthias Werner from Chemnitz University of Technology within the PhD Forum. Finally, Dirk Pleiter, together with Manuel Arenaz from University of A Coruña, will give insights into the project Maestro with their poster presentation "Middleware for memory and data-awareness in workflows (Maestro)".

Detailed information on JSC's participation can be found at https://fz-juelich.de/ias/jsc/isc20.

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