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Farewell, JUROPA

On 24 June 2015, our JUROPA cluster computer was phased out of operation, having reached the end of its – very effective – lifetime of almost six years. The acronym JUROPA refers to "Juelich Research on Petaflop Architectures". The JUROPA concept was developed as an early co-design project at a time when nobody was talking about co-design. It followed a best-of-breed approach bringing together the most performant processors at this time from Intel, the Nehalem processors, the most efficient QDR Infiniband network by Mellanox, the most effective cabling and switch technology developed by SUN, the most evolved cluster computing software ParaStation by ParTec and the expertise of Europe's most experienced system integrator and vendor, Bull.

Already in 2009, JUROPA achieved a total performance of nearly 300 teraflops. According to Linpack, it was also one of the most efficient cluster systems. With JUROPA, Jülich made its most successful investment ever in terms of supercomputers. JUROPA helped deliver a host of extremely valuable scientific results, ranging from astrophysics to security research, via quantum physics, brain research, biophysics and social sciences, etc. Many Science and Nature papers attest to the system's success.

JUROPA will soon be replaced by JURECA, the E in which stands for the direction towards exascale computing, although of course there is still a long way to go. Our hardware partner is T-Platforms from Moscow and we will be using Intel Haswell processors and Mellanox EDR-technology, once again operated via ParTec's ParaStation. JURECA will exploit self-healing mechanisms developed on JUROPA.

When JUROPA was switched off, it was in a better state than ever had been till then. Co-development and continuous co-design do pay off.

(Contact: Prof. Thomas Lippert, *th.lippert@fz-juelich.de*)

JSC@ISC'15

The International Supercomputing Conference 2015 (ISC'15) will take place from 12-16 July 2015 in Frankfurt am Main. JSC, together with its partners in the Gauss Centre for Supercomputing (GCS), HLRS (Stuttgart) and LRZ (Garching), will present its wide-ranging supercomputing activities at the GCS booth (#1310).

In particular, JSC will showcase LLview, the comprehensive interactive monitoring software for supercomputers developed in-house, demonstrating live the operation of various supercomputers worldwide. In addition, JSC will also show the LLview monitoring components of the Eclipse PTP development environment for supercomputing applications. A wide spectrum of scientific results obtained with its supercomputers will be exhibited in the form of videos and animations. Finally, JSC's participation in the Human Brain Project will be another hot topic.

JSC staff will organize a workshop entitled "Application Extreme-Scaling Experience of Leading Supercomputing Centers"

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and a Birds-of-a-Feather session, "Acceleration of Numerical Applications on POWER". Furthermore, they will give several presentations at the conference, among them the presentation of the Hans Meuer Award-winning paper (see below). Together with its partners in the European Exascale Projects, JSC will organize the workshop "Is Europe Ready For Exascale? A Summary of Four Years of European Exascale Research".

Members of JSC will also be on hand at the European Exascale Projects (#634), the PRACE (#1201), the JARA (#1320) and the UNICORE (#553) booths. Detailed information on JSC's participation can be found at *http://www.fz-juelich.de/ias/jsc/isc15*.
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Hans Meuer Award for Paper on In-Memory Processing

For modern high-performance computing architectures, it is becoming increasingly difficult to balance compute performance and data bandwidth. This challenge could be mitigated by moving compute capabilities closer to the data. This approach has yet another advantage: it has huge potential for improving energy consumption, as data movement is, in most cases, more expensive than data processing. One example of moving compute capabilities closer to the data is known as in-memory processing. A team at IBM Research recently designed a new version of such an architecture, which exploits new options for the three-dimensional stacking of logic and memory dies and is therefore called the Active Memory Cube (AMC).

Researchers at JSC are collaborating with IBM at the Exascale Innovation Center to explore the capabilities of this new technology. Performance-critical code sections of relevant applications have been implemented for the new architecture, such that performance can be investigated on the basis of cycle-accurate simulations. In order to explore performance at system level, a performance model approach was applied.

The results were presented in the paper "Accelerating LBM & LQCD Application Kernels by In-Memory Processing" which was not only accepted by the ISC High Performance 2015 conference, but also received the Hans Meuer Award. This award was introduced in memory of Hans Meuer, who was a co-founder of this conference, as well as of the TOP500 list.
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Simulations Pave the Way to New Source of THz Radiation

The terahertz frequency range is one of the last regions of the electromagnetic spectrum still to be fully exploited in everyday life, despite its potential for numerous applications in spectroscopy, biomedicine and communication technology. This is because THz radiation, with a wavelength of 0.1-1 mm, is difficult to generate by optical or electronic means, and until now was only accessible using large accelerator facilities. In a recent article in Physical Review Letters, Wei-Min Wang and Paul Gibbon from JSC, together with collaborators at the University of Strathclyde and the Institute of Physics, Chinese Academy of Sciences in Beijing presented a new scheme that uses short-pulse lasers to expand the capabilities of terahertz sources currently being developed. Using a series of extensive calculations performed on Jülich's supercomputer JUQUEEN, the authors showed how circularly polarized, multi-cycle THz pulses can be generated with the help of a strong, externally imposed magnetic field. The experimental realisation of this new source presents a formidable technical challenge, but would considerably expand the application potential of THz radiation. The original article can be viewed at *http://dx.doi.org/10.1103/PhysRevLett.114.253901*
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Workshop on Computational Solar and Astrophysics Modelling

This five-day summer school takes place from 14-18 September and will introduce young researchers (advanced masters students, PhDs and junior postdoctoral researchers) to modern open-source numerical astrophysics models with a heavy emphasis on hands-on tutorial sessions. After introductory morning lectures, participants will work with three different open-source software packages, AMRVAC, iPIC3D and SWIFT, applying these to typical solar and astrophysical situations, ranging from the heliosphere to cosmological phenomena on the Jülich supercomputer systems. The school is open to a maximum of 28 participants, and is supported by a Belgian Belspo-funded Interuniversity Attraction Pole, CHARM (*http://wis.kuleuven.be/CHARM*), connecting the heliospheric and astrophysical communities. Further information and the registration form can be found at: *http://www.fz-juelich.de/ias/jsc/csam-2015*
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Thomas Neuhaus and Walter Nadler Pass Away

Sadly, JSC must report that our highly valued and respected colleagues, Dr. habil. Thomas Neuhaus and Dr. Walter Nadler passed away at the beginning of June. Both deaths were totally unexpected and our institute remains in shock at these tragedies. We will sorely miss them. For their obituaries, please see: *http://www.fz-juelich.de/ias/jsc/obituaries*.

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