

Start of Production on the JURECA System

On November 2, 2015 the JURECA general-purpose supercomputer started production at full scale at Jülich Supercomputing Centre in Forschungszentrum Jülich. JURECA, which stands for “Jülich Research on Exascale Cluster Architectures”, succeeds the popular JUROPA cluster which served computing time to a wide variety of European research and industry projects from 2009 to 2015. As its predecessor, the system has been co-designed by JSC together with the project partners, in this case T-Platforms and ParTec, as a versatile and balanced system for compute- and data-intense scientific applications. JURECA's peak performance of 1.8 Petaflop/s is six times higher than that of JUROPA while energy consumption has dropped

the system components and configuration see, [1].

In order to minimize the downtime for the users during the system installation as much as possible, the buildup of JURECA had been organized in two phases. This was necessary since a parallel operation of JUROPA and the complete 34 rack JURECA system was not feasible due to a lack of available floor space. The first phase, consisting of 160 compute nodes in six racks, replaced the JUROPA system; this first phase offered the same peak performance at a strongly reduced energy and floor footprint. In this way large parts of the full JURECA system could be set up and tested while production continued. In October a downtime was



Figure 1: Side view of the JURECA system at Jülich Supercomputing Centre in Forschungszentrum Jülich.

by approximately one third. With the addition of 150 NVIDIA K80 GPUs in Mid-December 2015, the peak performance was further boosted to 2.2 Petaflop/s. For technical details about

required to finalize the top-level InfiniBand cabling, while integrating the six racks from the first phase during the process, and to perform final stabilization tests.

With a High-Performance Linpack (HPL) performance of 1.42 Petaflop/s on 1,764 compute nodes JURECA entered on position 50 in the TOP500 November 2015 list and placed among the five fastest systems in Germany. On the High-Performance Conjugate Gradient (HPCG) benchmark, JURECA achieved an impressive 68.3 Teraflop/s corresponding to place 18 on the HPCG November 2015 list.

From the start, JURECA has shown a very satisfactory stability despite the cutting edge software and hardware technology employed in the system, such as the brand-new Mellanox Extended Data Rate (EDR) InfiniBand network. During the setup and the early operation of JURECA the lessons learned from the JUROPA project have proven invaluable. Building on this foundation, JSC, T-Platforms and ParTec, will collaboratively improve the system setup and software stack to establish a similarly solid foundation for next-generation cluster systems.

JURECA has been warmly welcomed by users. Between autumn 2014 and summer 2015, JSC provided access to a Haswell test cluster that allowed users to adapt their codes and workflows early on to the software stack on JURECA. This opportunity has been widely used, as could be seen by the nearly optimal usage of the system shortly after the start of production on the first phase.

JURECA is available for all eligible scientists. Computing time is granted by the John von Neumann Institute for Computing (NIC) as well as through the Jülich Aachen Research Alliance (JARA-HPC/VSR).

References

- [1] Jülich Supercomputing Centre, JURECA: General-purpose supercomputer at Jülich Supercomputing Centre. *Journal of large-scale research facilities*, 2, A62. <http://dx.doi.org/10.17815/jlsrf-2-121>, 2016

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