

JSCNews

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Blue Gene Active Storage Boosts I/O Performance at JSC

The ever growing complexity of various simulation tasks not only requires a continuous increase in computing power but also the capability of managing large amounts of data. An active storage architecture and integration of non-volatile memory into Blue Gene/Q enables data-intensive applications to exploit the performance of this highly scalable high-performance computing system. The Blue Gene Active Storage system (BGAS) is the result of a close collaboration between Forschungszentrum Jülich and IBM in the framework of the Exascale Innovation Centre (EIC). It is attached to the Blue Gene/Q system JUQUEEN at JSC.

Active storage is an architectural concept that addresses the increasing costs of data transport between compute and storage systems. Therefore, computing power and storage are much more tightly integrated. In BGAS this is combined with the power of non-volatile memory technologies, which feature not only high bandwidth but in particular very high access rates. The BGAS system at JSC consists of 32 processors each connected to a newly designed PCIe card comprising 2 terabytes of SLC NAND flash memory. The nodes are integrated in a high-performance network and connected to both the Blue Gene/Q compute system and an external storage system.

BGAS opens up new opportunities, e.g. for neuroscience simulations. During extensive simulations of neuronal networks, large amounts of data must be stored exter-

nally in order to be analysed later. However, no typical HPC system does provide sufficient I/O capabilities to cope with the generated data that researchers would like to analyse. BGAS sustains the required data rates, provides the compute power to analyse the data, and also facilitates interactive access to the data.

(Contact: Prof. Dr. Dirk Pleiter,
d.pleiter@fz-juelich.de)

New Entries to the High-Q Club

In June, JSC established the High-Q Club, a showcase for codes able to utilize the entire 28-rack BlueGene/Q machine at JSC. The aim of this club is to encourage developers to invest in tuning and scaling their codes. We also want to promote the idea of exascale computing with its many-core machines and lead the way to millions of threads that will become state of the art. The club has recently attracted increasing attention as shown by five new entries, doubling the number of members to a total of ten.

The new members of the High-Q Club are: **JuSPIC**, the Jülich scalable Particle-in-Cell code developed at JSC; **MP2C**, the Massively Parallel Multi-Particle Collision Dynamics code, also from JSC; **$\mu\varphi$ (muPhi)**, a code for simulating the flow and transport in porous media from the University of Heidelberg; **NEST**, the Neural Network Simulation Tool by the NEST Initiative; and **PMG-PFASST**, a space-time parallel multi-level solver where JSC and the Institute of Computational Science of the Universität

Forschungszentrum Jülich GmbH
in der Helmholtz-Gemeinschaft
Jülich Supercomputing Centre
52425 Jülich | Germany

Phone +49 2461 61-6402

jsc@fz-juelich.de
www.fz-juelich.de/jsc

della Svizzera italiana in Lugano have combined the PMG and PFASST codes, developed at the University of Wuppertal and Lawrence Berkeley National Lab, respectively.

With respect to the current members of the High-Q Club, the majority use hybrid programming models to achieve good scaling to the full JUQUEEN and can easily run with more than a million parallel threads. Some of the codes also make use of SIONlib, a scalable library for the parallel I/O to task-local data with a resulting I/O performance well above 50 GB/s when all I/O nodes are used. To qualify for High-Q Club status, application developers should submit evidence of scalability across all available cores on JUQUEEN, preferably including multi-threading capability. A workshop will be offered in February to give more JUQUEEN users the chance to optimize their codes (see below). More information on the High-Q Club is available at <http://www.fz-juelich.de/ias/jsc/high-q-club>.

(Contact: Dr. Dirk Brömmel, d.broemmel@fz-juelich.de)

2nd JUQUEEN Porting and Tuning Workshop

Encouraged by the success of this year's first workshop and the positive feedback received, JSC will hold a second JUQUEEN Porting and Tuning Workshop from 3-5 February 2014. The main focus will again be on hands-on sessions for JUQUEEN users to port and tune their code with support from our experts. This will be accompanied by talks on both common as well as highly specialized performance tips and tools. This time, the special interest group will concentrate on the field of computational fluid dynamics, promising a comparison of different solvers' performance on BlueGene/Q. Registration deadline for the workshop is 5 January 2014. Details on the workshop can be found at <http://www.fz-juelich.de/ias/jsc/events/juqueenpt14>.

(Contact: Dr. Dirk Brömmel, d.broemmel@fz-juelich.de)

NIC Symposium 2014

The 7th NIC Symposium will be held at Forschungszentrum Jülich from 12 to 13 February 2014. The talks will inform a broad audience of scientists and interested members of the public about the activities and results obtained in the last two years by research projects supported through the John von Neumann Institute for Computing (NIC) on the JUROPA, JUGENE, and JUQUEEN supercomputers at Jülich. Invited talks and a poster session will cover topics in the fields of astrophysics, biophysics, chemistry, elementary particle physics, condensed matter, materials science, soft matter science, earth and environmental research, fluid mechanics, plasma physics, and computer science. To accompany the conference, a comprehensive proceedings volume will also be published. It will cover an even wider range of projects than represented by the talks. The detailed programme and the registration form are available at

<http://www.fz-juelich.de/ias/jsc/events/nic-symposium>.

(Contact: Dr. Walter Nadler, w.nadler@fz-juelich.de)

6th BrainScaleS CodeJam Workshop

The CodeJam workshops, initiated by the EU project BrainScaleS, intend to catalyse open-source, collaborative software development in computational and systems neuroscience and neuroinformatics by bringing together researchers, students, and engineers to share ideas, present their work, and write code together. The 6th BrainScaleS CodeJam will be held on 27 to 29 January 2014 at JSC with a focus on high-performance computing and is organized by the Simulation Lab Neuroscience (SLNS). To learn more about the event and to register please visit the website <http://www.fz-juelich.de/ias/jsc/events/codejam>.

(Contact: Prof. Abigail Morrison, a.morrison@fz-juelich.de)

End of Year Colloquium 2013

Date: Monday, 16 December 2013, 09:30-16:00

Venue: Jülich Supercomputing Centre, Hörsaal

Talks will be given in German.

Info: <http://www.fz-juelich.de/ias/jsc/events/eyc-2013>

09:30 Thomas Lippert: Welcome

09:45 Björn Hagemeyer: Über den Wolken – Wissenschaftliche Anwendungen in der Cloud

10:15 Stephan Graf: GPFS Storage Server – Wie PERSEUS die Daten beschleunigt

11:15 Salem El Sayed: Warum im Speicher rechnen und wie? – Blue Gene Active Storage (BGAS)

11:45 Mathias Winkel: Stöße und kollektive Phänomene in stark gekoppelten Plasmen – Hoch aufgelöste Simulationen mit einem parallelen Tree-Code

14:00 Stefan Holl: Drängeln für die Wissenschaft

14:30 Anna Westhoff: Weihnachtsdeko mal anders – Segmentierung hochauflösender Hirnbilder auf JUDGE

15:00 Boris Orth: An Bord des Flaggschiffs – Das Human Brain Project

15:30 Thomas Lippert: Weißt Du wie viel Sternlein stehen? – Von kleinen Rechnern und großen Daten

Events

Open Dialogue on Pre-Commercial Procurement of Innovative HPC Solutions for the Human Brain Project

Date: 18 December 2013, 10:30-16:30

Venue: Sheraton Brussels Airport Hotel

Info: <http://www.fz-juelich.de/ias/jsc/events/hbp-od-pcp>

2nd JUQUEEN Porting and Tuning Workshop

Date: 3-5 February 2014, 9:00-17:00

Venue: Jülich Supercomputing Centre, Rotunda

Info: <http://www.fz-juelich.de/ias/jsc/events/juqueenpt14>

Editor: Dr. Sabine Höfler-Thierfeldt, ext. 6765