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RIKEN
University of Tsukuba
Fujitsu Limited

K computer Recognized in Class 1 and 2 of the HPC Challenge Awards

Top honors awarded for productivity in a high-performance supercomputer parallel programming language implementation (a first for Japan) and overall performance

RIKEN, the University of Tsukuba and Fujitsu today announced that they were recognized in the 2013 HPC Challenge Awards. RIKEN and the University of Tsukuba received the prize in the HPC Challenge Class 2 Awards, which recognize the overall performance of a programming language. This recognition is based on performance results measured using the K computer for implementations of the high-performance supercomputer parallel programming language XcalableMP, which was jointly developed by RIKEN and the University of Tsukuba. This is the first time a Japanese organization has received the award.

Furthermore, RIKEN, the University of Tsukuba, and Fujitsu received top ranks in three of the four benchmarks at the 2013 HPC Challenge Class 1 Awards for the performance of the K computer. The first-place rankings were received in the following three benchmarks used for evaluating the all-around performance of a supercomputer: (1) Global HPL, which measures the floating point rate of execution for solving a linear system of equations; (2) EP STREAM (Triad) per system, which measures sustainable memory bandwidth and the corresponding computation rate for simple vector kernels; and (3) Global FFT, which measures the floating point rate of execution of double precision complex one-dimensional Discrete Fourier Transform.

With this, the K computer ranked first, for the third consecutive year from 2011 to 2013, in the HPC Challenge Class 1 Awards. The awards were announced on November 21, 2013 in Denver, Colorado at SC13, the International Conference for High Performance Computing, Networking, Storage and Analysis.

The HPC Challenge benchmarks are benchmark programs designed to evaluate the overall performance of supercomputers in terms of processing performance in 28 tests derived from frequently used computational patterns in the field of scientific computation. There are two classes of awards: Class 1, which measures benchmark performance values, and Class 2, which measures the productivity of programming language implementations.

The HPC Challenge Class 2 Award, the first to be received by a Japanese organization, is a contest for programming languages used in developing HPC applications. Among the 28 tests mentioned above, the award is designed to evaluate both programming language productivity and performance for four HPC Challenge benchmarks: Global HPL, which measures the floating point rate of execution for solving a linear system of equations; Global RandomAccess, which measures random memory access performance in parallel processing; EP STREAM (Triad) per system, which measures memory access speed under multiple loads; and Global FFT, which measures total performance of Fast Fourier Transform. Participants can also choose to include up to two additional benchmarks besides the HPC Challenge benchmarks for consideration, and the award is determined based on the total score for the implementations including the additional benchmarks.

The award-winning XcalableMP is a programming language that was jointly developed by the RIKEN Advanced Institute for Computational Science and the University of Tsukuba's Center for Computational Sciences. The HPC Challenge benchmarks and the Himeno benchmark (a benchmark program to evaluate the performance of incompressible fluid analysis code) are the benchmarks that were implemented. The performance results of each of these benchmarks on K computer demonstrated that implementations using XcalableMP exhibit extremely high performance.

Programming languages that can be used to develop highly productive, high-speed applications that run on large-scale computation environments – such as K computer – make it possible to accelerate the pace of research. As a result, they are highly desirable by researchers both inside and outside Japan. The awards

reveal both the high productivity and high performance of XcalableMP, in addition to demonstrating the substantial effectiveness of XcalableMP for developing HPC applications.

The K computer, which was developed jointly by RIKEN and Fujitsu as a part of the High-Performance Computing Infrastructure (HPCI) initiative led by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT), was opened to shared use in September 2012. The University of Tsukuba contributed extensively to increasing the computational speed for the Global FFT benchmark.

Additional Information

- HPC Challenge Benchmark: http://icl.cs.utk.edu/hpcc/index.html
- RIKEN Advanced Institute for Computational Science: http://www.aics.riken.jp/en/
- Center for Computational Sciences, University of Tsukuba: http://www.ccs.tsukuba.ac.jp/CCS/eng/
- Fujitsu's website on the K computer: http://www.fujitsu.com/global/about/tech/k/

XcalableMP:
http://www.xcalablemp.org/

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About Fujitsu
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