

COSMOS supercomputing research facility becomes an Intel Parallel Computing Centre

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Cambridge's COSMOS supercomputer, the largest shared-memory computer in Europe, has been named by computer giant Intel as one of its Parallel Computing Centres, building on a long-standing collaboration between Intel and the University of Cambridge.

The COSMOS facility, which is located in the Stephen Hawking Centre for Theoretical Cosmology (CTC) at the University, is dedicated to research in cosmology, astrophysics and particle physics. It was switched on in 2012.

To date, the facility has been used to simulate the dynamics of the early Universe and for pipelines analysing the statistics of Planck satellite maps of the cosmic microwave sky. The COSMOS supercomputer was the first very large (over 10 terabyte) single-image shared-memory system to incorporate Intel Xeon Phi coprocessors, which are behind the most power-efficient computers in the world.

Intel Parallel Computing Centres (IPCC) are universities, institutions, and labs that are leaders in their field. The centres are focusing on modernising applications to increase parallelism and scalability through optimisations that leverage cores, caches, threads, and vector capabilities of microprocessors and coprocessors.

As an IPCC, the COSMOS research facility will receive enhanced Intel support from its applications and engineering teams, as well as early access to future Intel Xeon Phi and other Intel products aimed at high-performance computing. IPCC status will allow COSMOS to better focus on delivering computing advances to the scientific community it serves and also highlight the efforts Intel has put into advancing high-performance computing.

When operating at peak performance, the COSMOS Supercomputer can perform 38.6 trillion calculations per second (TFLOPS), and is based on SGI UV2000 systems with 1856 cores of Intel Xeon processors E5-2600, 14.8 TB RAM and 31 Intel® Xeon Phi™ coprocessors.

The research centre has already developed Xeon Phi for use in Planck Satellite analysis of the cosmic microwave sky and for simulations of the very early Universe. These capabilities will become even more important in the near future pending the arrival of new generations of Intel Xeon Phi coprocessors and associated technologies.

"I am very pleased that the COSMOS supercomputer centre has been

selected among the vanguard of Intel Parallel Computing Centres worldwide," said Professor Stephen Hawking, founder of the COSMOS Consortium. "These are exciting times for cosmology as we use COSMOS to directly test our mathematical theories against the latest observational data. Intel's new technology and this additional support will accelerate our scientific research."

"Building on COSMOS success to date with Intel's Many Integrated Core-based technology, our new IPCC status will ensure we remain at the forefront of those exploiting many-core architectures for cosmological research," said COSMOS director, Professor Paul Shellard. "With the SGI UV2 built around Intel Xeon processors E5-2600 family and Intel Xeon Phi processors, we have a flexible HPC platform on which we can explore Xeon Phi acceleration using distributed, offload and shared-memory programming models. Intel support will ensure fast code development timescales using MICs, enhancing COSMOS competitiveness and discovery potential."

"Intel Parallel Computing Centres are collaborations to modernise key applications to unlock performance gains that come through parallelism, enabling the way for the next leap in discovery.

We are delighted to be working with the COSMOS team in this endeavour as they strive to understand the origins of the universe," said Stephan Gillich, Director Technical Computing, Intel EMEA.

COSMOS is part of the Distributed Research utilising Advanced Computing (DiRAC) facility, funded by the Science & Technology Facilities Council and the Department of Business Innovation and Skills.

Provided by University of Cambridge

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