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CEA Ports the MPC Framework on Intel® Many Integrated Core (Intel® MIC) Architecture

The evolution of High-Performance Computing (HPC) architectures takes a leap from the *multicore* era to the *manycore* era. The increasing number of cores per socket significantly raises the performance of single-chip processor but it transfers the complexity to the programmer to exploit this large parallelism. Developers have to rely on parallel programming models like MPI, OpenMP or PGAS languages to leverage the performance of such architectures.

CEA has recently ported the parallel framework called MPC (<http://mpc.sourceforge.net>) to the Intel® Many Integrated Core (Intel® MIC) architecture. Co-developed in the Exascale Computing Research Laboratory (ECR), MPC is a parallel framework for clusters of NUMA machines aiming at unifying existing parallel programming models. It currently proposes a thread-based MPI 1.3 implementation, an OpenMP 2.5 compiler and runtime, and POSIX thread compatibility. The Intel® MIC architecture combines the benefits of Intel processor programming models with advanced performance on highly parallel applications. Intel's first commercial MIC product will be made on its 22nm manufacturing process and have more than 50 processing cores on a single chip.

Working with Intel's MIC architecture software development platform (codenamed "Knights Ferry"), CEA was able to port the MPC framework in just a few days. With this port, MPC provides the first open-source MPI library to run MPI applications on Intel MIC architecture without changing the original source code. This port has been successfully tested on CEA codes, paving the way to new approaches in scientific simulations capabilities. Thus, CEA provides a smooth solution to port MPI applications on the Intel MIC Architecture, leading to easy adaptation of legacy codes. CEA plans to release MPC with support for Intel MIC Architecture later in 2012.

About the CEA

The French Alternative Energies and Atomic Energy Commission (CEA) leads research, development and innovation in four main areas: low-carbon energy sources, global defense and security, information technologies and healthcare technologies. The CEA's leadership

position in the world of research is built on a cross-disciplinary culture of engineers and researchers, ideal for creating synergy between fundamental research and technology innovation. With its 15,600 researchers and collaborators, it has internationally recognized expertise in its areas of excellence and has developed many collaborations with national and international, academic and industrial partners.

About ECR

The Exascale Research Computing Laboratory is a public/private collaboration between CEA, GENCI, University of Versailles Saint-Quentin-en-Yvelines and Intel. The goal is to pave the road to Exascale by bringing together large data centre expertise, major software portfolio management skills, computer science research teams and access to the latest available technologies.

Links referenced within this article

CEA

<http://www.cea.fr>

<http://www-hpc.cea.fr/>

Exascale Computing Research

<http://www.exascale-computing.eu>

MPC

<http://mpc.sourceforge.net>