LSU Receives Intel Grant for Open-Source Software Development

Source: *HPC Wire*

BATON ROUGE, Louisiana, May 29 –The LSU Center for Computation & Technology, or CCT, was recently selected by Intel as one of its Intel Parallel Computing Centers, or IPCC.

Through a grant from Intel, LSU CCT will work to develop open-source software focusing on simulation of flows through micropores, such as those found in rocks involved in oil and gas extraction, by extending OpenFOAM, a popular open-source simulation software.

“LSU is proud to be recognized as an Intel Parallel Computing Center,” said Honggao Liu, CCT deputy director. “At CCT, we use high-performance computing to unite experts in numerous fields of study. This grant and multi-disciplinary project will allow us to better understand and solve issues within this critical software. Working with Intel not only benefits LSU by giving us access to Intel’s vast expertise, but it also benefits each of the department involved in the project as well as those who will be able to use the enhancements we work to develop.”

In becoming an IPCC, LSU joins other universities in the country including the Georgia Institute of Technology, Purdue University, the University of Tennessee and the University of Texas at Austin’s Texas Advanced Computing Center, among others.

The LSU IPCC will undertake code performance scaling, profiling, and optimization of OpenFOAM on the Intel Xeon Phi coprocessors, such as those installed in LSU’s SuperMIC high-performance computing, or HPC, cluster. This will help in developing algorithms suited to fundamental physics problems that use HPC resources efficiently. The problem to be studied involves fluid and particular flows in porous materials modeled with high-resolution meshes. The challenge is to accurately treat particle interactions along with the fluid flows. The computational loads are expected to be high due to the large numbers of particles and mesh points needed to accurately capture real-world conditions, thus close attention will be paid to computational efficiencies. Since open-source community codes will be used, OpenFOAM in particular, the enhancements will become generally available to the user community.

SuperMIC, LSU’s newest 1-PF class Intel Xeon Phi coprocessor equipped cluster expected to be operational by June, will serve as the development platform for extending OpenFOAM through the incorporation of modules using the coprocessors. The broader computational sciences community will benefit greatly from the distribution of accelerated modules of OpenFOAM, which may lead to improvements in other computational fluid dynamics-related projects.

“Modernizing the underlying codes used in scientific and industrial research is critical to advancing the pace of discovery and innovation. We’re thrilled to have LSU join us in this effort. The work they’ll accomplish on modernizing OpenFOAM codes for Intel architecture will have a broad and lasting impact on the community for years to come,” said Bob Burroughs, the director of technical computing ecosystem enabling at Intel.

Principal investigators on the project include Liu; James A. Lupo, CCT assistant director for computational enablement; Mayank Tyagi, joint associate professor of petroleum engineering and CCT faculty member; Krishnaswamy Nandakumar, Gordon A. and Mary Cain Endowed Chair professor in the Cain Department of Chemical Engineering; and Karsten Thompson, chair of the Craft & Hawkins Department of Petroleum Engineering.

“OpenFOAM development on the latest accelerator technology from Intel is of great value to scientists and engineers. CCT and LSU greatly value this partnership with Intel,” said CCT Director J. “Ram” Ramanujam.

About the LSU Center for Computation & Technology

The LSU Center for Computation & Technology is an interdisciplinary research center at LSU. By uniting experts from diverse fields, ideas are disseminated to foster invention. The center concentrates on use of advanced computing infrastructure to conduct research in many different fields which touch disciplines related to science, mathematics, engineering, business, digital media, mass communication, art, music, humanities and more. To learn more, visit https://www.cct.lsu.edu.

About Intel Parallel Computing Centers

Intel Parallel Computing Centers are universities, institutions and labs that are leaders in their field. The centers are focusing on modernizing applications to increase parallelism and scalability through optimizations that leverage cores, caches, threads, and vector capabilities of microprocessors and coprocessors. Code modernization is expected to enable large performance increases while maintaining the code portability users expect. Training engineers on modernizing their code is also necessary. To meet this need, the centers are developing a curriculum to equip students, scientists, partners and computer scientists with the skills to fully realize the capabilities of parallel computing resources. By enabling the advancement of parallelism, the Intel Parallel Computing Centers will accelerate discovery in the fields of energy, finance, manufacturing, life sciences, weather and beyond. For more information, visit https://software.intel.com/en-us/articles/intel-parallel-computing-centers.

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Center for Computation & Technology
2003 Digital Media Center • Telephone: +1 225/578-5890 • Fax: +1 225/578-8957