

Advanced OpenMP Tutorial

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Abstract:

OpenMP is a widespread standard for shared memory parallel programming. It has been widely accepted in academia and industry for multithreaded applications in the field of High Performance Computing. OpenMP is under constant development and many interesting features beyond the traditional loop-level parallelism have been added in the last few years to better support current HPC platforms. These features include task parallel programming, support for Accelerators and SIMD vectorization.

The goal of this tutorial is to make participants aware of these new OpenMP features and to present use cases where they have been applied successfully. This should allow application developers to parallelize and optimize their Codes for current architectures using OpenMP.

At the beginning of the tutorial a very brief overview of basic OpenMP functionality is given. Then CPU centric features like NUMA optimization, SIMD support and tasking are presented. Finally, the basic concepts of target programming for accelerators are shown.

Outline:

Part 1: Recap of OpenMP basics (no more than 1 h depending on the audience)

Part2: NUMA optimization and SIMD (1 h)

Part 3: Task parallel programming in OpenMP (1 h)

Part 4: Accelerators (1 h)