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OpenMC: towards simplifying programming for TianHe supercomputers.


Summary: Modern petascale and future exascale systems are massively heterogeneous architectures. Developing productive intra-node programming models is crucial toward addressing their programming challenge. We introduce a directive-based intra-node programming model, OpenMC, and show that this new model can achieve ease of programming, high performance, and the degree of portability desired for heterogeneous nodes, especially those in TianHe supercomputers. While existing models are geared towards offloading computations to accelerators (typically one), OpenMC aims to more uniformly and adequately exploit the potential offered by multiple CPUs and accelerators in a compute node. OpenMC achieves this by providing a unified abstraction of hardware resources as workers and facilitating the exploitation of asynchronous task parallelism on the workers. We present an overview of OpenMC, a prototyping implementation, and results from some initial comparisons with OpenMP and hand-written code in developing six applications on two types of nodes from TianHe supercomputers.

Keywords: supercomputer; programming model; heterogeneous; MIC

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