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SIMULATeQCD: A simple multi-GPU lattice code for QCD calculations

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The rise of exascale supercomputers has fueled competition among GPU vendors, requiring lattice QCD practitioners to write code that supports multiple GPU architectures and APIs. We present SIMULATeQCD, a simple multi-GPU lattice code for large-scale QCD calculations, mainly developed and used by the HotQCD collaboration. Our open source code is built on C++ and MPI, includes CUDA and HIP back-ends and leverages modern C++ language features to provide high level data structures, objects and algorithms that allow users to express lattice QCD calculations in an intuitive way without sacrificing performance. In this talk, we explain the design strategy, discuss implementation details, and show benchmarks of performance critical kernels on recent supercomputers, including Perlmutter and Frontier.

Topical area

Software Development and Machines

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