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Lattice SU(2) on GPU's

Tuesday, 15 June 2010 18:00 (5 minutes)

We discuss the CUDA approach to the simulation of pure gauge Lattice SU(2).
CUDA is a hardware and software architecture developed by Nvidia for computing on the GPU.

We present an analysis and performance comparison between the GPU and CPU with single precision.

Analysis with single and multiple GPU's, using CUDA and OPENMP, are also presented.

In order to obtain a high performance, the code must be optimized for the GPU architecture, i.e., an implementation that exploits the memory hierarchy of the CUDA programming model.

Using GPU texture memory and minimizing the data transfers between CPU and GPU, we achieve a speedup of 200x using 2 NVIDIA 295 GTX GPU's relative to a serial CPU, which demonstrates that GPU's can serve as an efficient platform for scientific computing.

With multi-GPU's we are able, in one day computation, to generate 1,000,000 gauge configurations in a 48^4 lattice with $\beta=6.0$ and calculate the mean average plaquette. We present results for the mean average plaquette in several lattice sizes for different β . Finally we present results for the mean average Polyakov loop at finite temperature.

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poster

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