CUDA Center of Excellence

Yeh-Ching Chung, Chung-Ta King, Shih-Chieh Chan, Ruen-Rone Lee, Che-Rung Lee, Chuan-Hsiang (Sean) Han, Po-Chung Chen, Jyh-Shing Roger Jang, Weichung Wang, Ying-Jer Kao, Chun-Yuan Lin, Tyng-Yeu Liang

Scientific Computing on GPU

• Medical imaging
  • Circular CT, Dual-head PET
  • Low-dose, High-resolution
  • CT-PET multifidelity algorithms
  • Computation and/or memory bound acceleration
  • Results: GPU algorithm speedup 10X. Multi-GPU linear scale-up

• Numerical linear algebra
  • Auto-Tuning for dense QR factorization for minimal time
  • Statistical model to balance CPU-GPU loading

Computer Systems with GPU & for GPU

• Network intrusion detection
  • To inspect network packet content to protect computer systems from network attacks such as denial of service attacks, port scans, or malware.

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• OMPICUDA
  • Allow compound OpenMP/MPI
  • Compile all the OpenMP parallel regions in a user program into two different versions of dynamical linking libraries based on CPU and/or GPU

  • Dynamic load balance among heterogeneous processors

Applications and Services using GPU

• Computational finance
  • Volatility Estimation by Fourier Transform Method
  • Model Calibration to Implied Volatility Surface
  • Rare Event Simulations
  • GPU-based importance sampling
  • Entropy-based importance sampling

• Music information retrieval
  • MIRACLE: A Music Information Retrieval System with Clustered Computing Engines
  • LATTE: retrieval of Audio fingerprinT Through parallel Engine

CUDA Programming Contest and SCC

• CUDA programming contest in Taiwan 2013
  • The first prize goes to “GPU-Based Monte Carlo Calibration to Implied Volatility Surfaces under Multi-Factor Stochastic Volatility Model”

• Student Cluster Challenge (SCC)
  • SCC is a competition for students to run HPL and several HPC applications on a small cluster.
  • NVIDIA and NTHU-Ccoe supports students to SCC@SC, Taiwan SCC, and Asia Student Supercomputer Challenge (ASC).
  • Image for ASC13. Students from NTHU is the runner-up. The machine uses 8 K20.

Contact Name: Che-Rung Lee: cherung@gmail.com
Poster P4280
Category: Finance - Fi02