Future Science and Engineering Breakthroughs Hinge on Computing

- Computational Geoscience
- Computational Chemistry
- Computational Medicine
- Computational Modeling
- Computational Physics
- Computational Biology
- Computational Finance
- Image Processing
The Future Computing is Parallel

- CPU clock rate growth is slowing, future speed growth will be from parallelism

- GeForce-8 Series is a massively parallel computing platform
  - 12,288 concurrent threads, hardware managed
  - 128 SP Thread Processor cores at 1.35 GHz \( \approx \) 518 GFLOPS peak

GPU Computing features enable C on Graphics Processing Unit
Implications and Opportunities

Massively parallel computing allows
  • Drastic reduction in “time to discovery”
  • New, 3\textsuperscript{rd} paradigm for research: computational experimentation
  • The “democratization of supercomputing”
    - $3,000/Teraflop in personal computers today
    - $5,000,000/Petaflops in clusters in two years
    - HW cost will no longer be the main barrier for big science
    - Global competition will be won with abilities to create and use parallel systems for discovery
  • This is once-in-a-career opportunity for many!

Future winner academic institutions will be leaders in
  • research in Parallel Programming and Parallel Architecture
  • More importantly, teach massively parallel programming to CS/ECE students, scientists and other engineers.
  • UIUC is already uniquely positioned!

http://www.nvidia.com/Tesla
http://developer.nvidia.com/CUDA