Research Interest Overview

Manycore and Exascale Computing: Projected Growth Trends

  - 1~12 cores commodity architectures
  - 80 cores proprietary architectures
  - 480 GPU cores

  - ~1M nodes (20X~200X)
  - ~1B processor-cores/threads (5000X~20000X)

Pat Helland, Microsoft, The Irresistible Forces Meet the Movable Objects, November 9th, 2007

http://www.top500.org/
Specific Example

• Who will be affected?
  – Everyone

• How?
  – Desktops, Datacenters, Cloud Computing, Grid Computing, and Supercomputing

• Applications?
  – Weather modeling, global warming, national security, energy, drug discovery, medical imaging, bioinformatics, biochemistry, data analytics, economic modeling, astronomy, etc…

• My research focus:
  – Resource management at extreme scales
  – Architecting future computing and storage systems
  – Programming models for large-scale parallel/distributed systems
  – Supporting large-scale data/compute-intensive applications
Areas of Possible Collaboration

• Areas where I can help:
  – Expert in distributed systems and high-performance computing
    • Do you want to port your application from your laptop to a cluster, cloud, or even a supercomputer?
    • Do you want to learn about tools to help you parallelize your applications?
  – Do you have funds to build a small cluster, and want help on designing it to suit your specific needs?
  – Teaching:
    • CS595: Hot Topics in Distributed Systems: Data-Intensive Computing
    • CS550: Advanced Operating Systems (focused on Distributed Systems)

• Areas where I need help:
  – **Real Applications, real datasets, real workloads!!!**
  – **Theory:** I am a systems person, I build real systems, to solve real problems; however, sometimes looking at the problem from a theoretical perspective could be beneficial in design/analysis, especially when generalizing the work to future hypothetical systems.