5691 - HPC Seminar Hilary Term - 2014-2015

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Grading

- Presentation 50%: Students are assigned a presentation time and required to research a chosen topic and present a 15min talk on this topic to the class. While a general overview of a particular topic was acceptable for the first semester project, a specific aspect of a topic must be presented in depth for the second semester. This topic could be similar or related to the first semester presentation, or something completely different. Specific aspects of a topic could include:
 - an analysis of the performance and scaling properties of a parallel code on one or more architectures.
 - an in-depth presentation of the mathematical background of an algorithm.
 - a technical discussion of a hardware architecture.
- Report 50%: At the end of the semester, students are required to submit a 5 page report summarizing the research into the topic.

Appropriate research topics may be belong to the following list. Other topics are also permitted provided they are approved.

Suggested Topics

- HPC Hardware
 - GPGPU's
 - The Intel Xeon Phi
 - Cray XK7
 - BlueGene/Q
- HPC Software
 - LAPACK and BLAS
 - Linpack benchmark
 - The FFTW package
 - The x86 CPU instruction set
 - SSE instructions
 - Assembly code
- HPC Applications
 - numerical integration schemes in N-body simulations
 - hardware requirements in Fluid dynamics
 - scaling properties of Lattice QCD simulations

• HPC Algorithms

- The Self-avoiding walk, the pivot algorithm
- The Traveling Salesman Problem with simulated annealing
- Congugate Gradient algorithm
- Lanczos algorithm
- Any section in 'Numerical Recipes'