

CSE/ESE 569M
Parallel Architectures and Algorithms
Spring 2009

Course Description

The course considers key issues in the field of parallel computers, parallel algorithms, and programming environments. Four main topic areas are covered:

1. **Parallel Architectures.** The architecture of both shared memory and distributed memory parallel computers are presented. Additionally, architecturally diverse systems (co-processor accelerators) will receive some coverage.
2. **Parallel Programming Environments.** Two parallel programming paradigms are explored. The shared memory paradigm uses multithreaded programming associated with the Pthreads package. The message passing paradigm uses the Message Passing Interface (MPI). Both paradigms are used in conjunction with the C language.
3. **Issues in Parallel Programming and Algorithm Development.** Basic issues of importance in parallel programming are considered. These include the problems of partitioning and mapping, scheduling, load balancing, synchronization, performance evaluation and others.
4. **Exploration of Parallel Applications:** A selected set of applications will be considered and their parallel implementations developed.

In addition to regular homework assignments, a student project will be undertaken during the latter half of the semester that includes a fairly substantial implementation.

- Prerequisites: Unix, C experience, graduate student standing.
- Text: assigned readings from the literature, no text required. Past text: D. Culler, J.P. Singh, and A. Gupta, "Parallel Computer Architecture: A Hardware/Software Approach," Morgan Kaufmann, 1999. This text has lots of good material in it, but is a bit dated in terms of examples at this point in time.
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