CS 292
Introduction to Parallel Computing

Spring 2008
Vanderbilt University

Announcements

- Read Chapter 1 in class text
- Obtain an account on ACCRE cluster
- Sign up for ACCRE training classes (as needed)
- Complete student survey

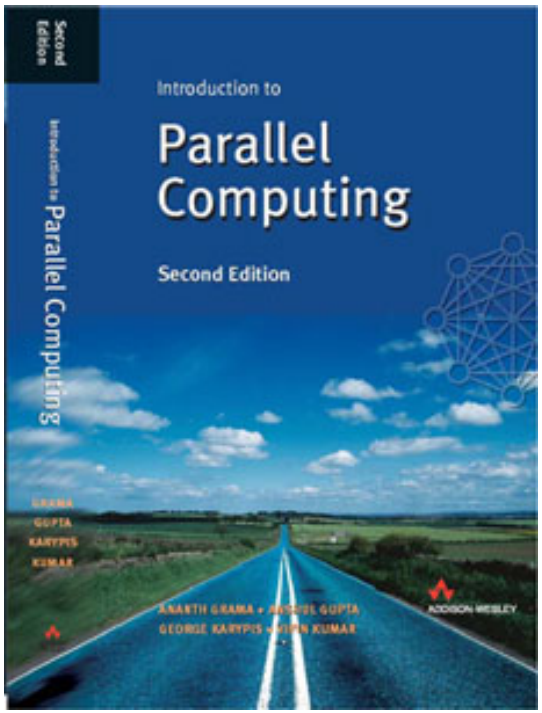
Course Staff

- Dr. Zhiao Shi
  - zhiao.shi@accre.vanderbilt.edu
  - Hill Center 201
- Dr. Jerry Roth
  - j.roth@vanderbilt.edu
  - Featheringill 220
- TA: Yann Cao
  - yanchuan.cao@vanderbilt.edu
  - Jacobs Hall 385, Desk B
- Office hours posted to Oak

Course Administration

- Course information will be provided through:
  - Oak
  - ACCRE web site: http://www.accre.vanderbilt.edu/education-outreach/cs292/index.php
  - We will do our best to keep these in sync

Text Book



Introduction to Parallel Computing
2nd Edition

Grama, Gupta, Karypis, & Kumar

Addison Wesley, 2003

Syllabus

- 5 or 6 Programming assignments
  - Performed on Vanderbilt's supercomputing facility: the Advanced Computing Center for Research and Education (ACCRE)
  - Apply for an account ASAP (link provided in Oak)
  - Sign up for training classes as necessary based on your background (at minimum: "Introduction to the Compute Cluster" and "Compiling Programs" courses)
  - All coding will be in C/C++. We'll be exploring several different parallel programming paradigms.
  - Deadlines for assignments are strict. Plan ahead.
  - Each assignment will be worth 10 points toward final grade.
  - All assignments will be individual efforts. The university's honor policy will be followed.

Syllabus

- 3 in-class exams
  - Exam #1: February 8
  - Exam #2: March 17
  - Exam #3: April 21 (last day of class)
  - The topics covered in the exams will not be cumulative (i.e., each exam will test you on the topics that were covered since the previous exam).
  - Each exam will be worth 30 points toward final grade.

Syllabus

- Grades:
  - Letter grades will be assigned based on the percentage of points awarded divided by the total points possible.

Percentage	Grade
85-100	A
70-84	B
55-69	C
<55	F

+ and – modifiers will be added to grades per instructor discretion.

Course Objectives

- Introduce you to the following:
  - The concept of improving performance via parallelism
  - Various methods for attaining parallelism
    - Implicit parallelism provided by computer architecture
    - Explicit parallelism specified by programmer*
  - Various parallel architectures
    - Physical vs. logical views
  - Various parallel programming methodologies*
  - Parallel algorithm design and analysis*
  - Methods to compare and contrast different options

* bulk of course will be on these topics

Course Topics

- Parallel Programming Platforms
- Principles of Parallel Algorithm Design
- Analytical Modeling of Parallel Programs
- Basic Communication Operations
- Programming Shared Address Space Platforms
- Programming Using the Message Passing Paradigm
- Dense Matrix Algorithms
- Sorting
- Graph Algorithms
- Search Algorithms for Discrete Optimization Problems

Why study parallel programming?

- Parallel computers have been around for decades. Why the renewed interest in parallel computing?
  - Multi-core microprocessors
  - Inexpensive supercomputer clusters (Beowulf systems)
  - Grid computing
  - Cloud computing
  - “Grand challenge” problems still abound

More Information

- Look up the following in Wikipedia:
  - Parallel computing
  - Grid computing
  - Cloud computing