

CS 594 - Understanding Parallel Architectures: From Theory To Practice

Web page for the course:

<http://www.cs.utk.edu/~dongarra/WEB-PAGES/cs594-2001.html>

CS 594

- ◆ **Understanding Parallel Architectures: From Theory To Practice**
- ◆ **Spring 2001 - 3 credits**
 - ↳ Jack Dongarra, Professor
- ◆ **Class will meet in Room C211, Claxton Building**
- ◆ **TA: ??**

To Get Hold of Us

- ◆ **Email:**
 - ✦ `dongarra@cs.utk.edu`
- ◆ **Phone: 974-8295 Fax: 974-8296**
- ◆ **Office hours:**
 - ✦ **Wednesday 11:00 - 1:00, or by appointment**

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Schedule of Topics

- ◆ **Introduction**
- ◆ **Parallel Programming Models and Machines**
 - ✦ *Shared Memory and Multithreading*
 - ✦ *Distributed Memory and Message Passing*
 - ✦ *Data parallelism*
- ◆ **Sources of Parallelism in Simulation**
- ◆ **Algorithms and Software Tools (depends on student interest)**
 - ✦ *Dense Linear Algebra*
 - ✦ *Partial Differential Equations (PDEs)*
 - ✦ *Load balancing, synchronization techniques*
 - ✦ *Sparse matrices*
 - ✦ *Visualization*
 - ✦ *Sorting and data management*
 - ✦ *Metacomputing*
- ◆ **Applications (including guest lectures)**
- ◆ **Project Reports**

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Grades Based on:

- ◆ 30% on weekly homework
(the lowest homework grade will be dropped)
- ◆ 30% on a written report and presentation
(20 pages circa.)
- ◆ 30% on a final exam (2 hours)
- ◆ 10% on class participation.

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Homework

- ◆ Usually weekly
- ◆ Lowest grade will be dropped
- ◆ Must be turned in on time (no late homework)
- ◆ Don't copy someone else's homework.
- ◆ Sometimes problems, sometimes programming assignment, sometimes requiring running a program to find the solution.

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Homework (continued)

- ◆ We expect an analysis and detailed discussion of the results of your efforts.
 - ↳ The program itself is not very interesting.
- ◆ Programming in C or Fortran or Java.
- ◆ Will go over the assignments the following week.
- ◆ See class web page weekly for details.

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Project

- ◆ Topic of general interest to the course.
- ◆ The idea is to read three or four papers from the literature (references will be provided)
- ◆ Synthesize them in terms of a report (~20 pages)
- ◆ Present your report to class (~30 mins)
- ◆ New ideas and extensions are welcome, as well as implementation prototype if needed.

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Final Exam

- ◆ In class
- ◆ Will cover the material presented in the course
- ◆ ~2 hours

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Material

- ◆ There is no book covering the complete scope for the class.
- ◆ For each lecture a comprehensive set of slides will be made available in postscript or html.
- ◆ Other reading material will be made available electronically if possible.
- ◆ The web site for the course is:

↳ <http://www.cs.utk.edu/~dongarra/WEB-PAGES/cs594-2001.html>

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What will we be doing?

- ◆ **Learning about:**
 - ▮ *High-Performance Computing.*
 - ▮ *Parallel Computing*
 - ▮ *Performance Analysis*
 - ▮ *Computational techniques*
 - ▮ *Tools to aid parallel computing.*
 - ▮ *Developing programs using PVM, MPI, HPF, and perhaps OpenMP.*

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Background

- ◆ **C and/or Fortran programming**
- ◆ **Knowledge of parallel programming**
- ◆ **Some background in numerical computing.**

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Computer Accounts

- ◆ For much of the class computing you can use our Pentium Cluster called TORC . More on this later
- ◆ If you have an account in the Department you have access to TORC.
- ◆ Cluster of PC's:
 - ⌘ see: <http://www.netlib.org/utk/torc/>

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First Hour of Class

- ◆ **CS594 Seminar Studies in Computer Science - Spring 2001**
 - ⌘ 1:25 - 2:25 pm, Wednesdays
 - ⌘ Claxton 205
 - ⌘ <http://www.cs.utk.edu/~seminar/>

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Seminars at 1:25 in Claxton 205

- ◆ **January 24, 2001 Dr. Shirley Moore**
 - "Performance Evaluation using Hardware Counters"
- ◆ **January 31, 2001 Dr. Steve Batsell**
 - "Next Generation Internet Security"
- ◆ **February 7, 2001 Dr. Peter Cummings**
 - "Molecular Modeling on Massively Parallel Supercomputers"
- ◆ **February 14, 2001 Dr. Wilfried Gansterer**
 - "Approximate Eigensolvers for Symmetric Block-Tridiagonal Matrices Based on a Divide-and-Conquer Approach"
- ◆ **February 21, 2001 Dr. Jack Dongarra**
 - "Research Activities in the ICL"
- ◆ **February 28, 2001 Wael Elwasif**
 - "The Internet Backplane Protocol: Shared storage for Enhanced Network Infrastructure"
- ◆ **March 14, 2001 Dr. Victor Eijkhout**
 - "Topics in Parallel Linear Systems Solving"
- ◆ **March 28, 2001 Dr. Tom Potok**
 - "Research in Intelligent Agents"
- ◆ **April 4, 2001 Dr. Stacy Prowell**
 - "Automated Support for Statistical Software Testing"
- ◆ **April 11, 2001 Dorian Arnold & Michelle Miller**
 - "NetSolve and Computational Grids"
- ◆ **April 18, 2001 Dr. Charles Romine**
 - "Computational Mathematics Research at ORNL"