

CS 594 – Understanding Parallel Architectures: From Theory To Practice

Web page for the course:
<http://www.cs.utk.edu/~dongarra/WEB-PAGES/cs594-2003.html>

CS 594 – Wednesday's 1:30 – 4:00

- ◆ **Understanding Parallel Architectures:
From Theory To Practice**
- ◆ **Spring 2003 – 3 credits**
 - ⌞ Jack Dongarra, Professor
- ◆ **Class will meet in Room C205, Claxton Building**
- ◆ **TA:**

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To Get Hold of Us

- ◆ **Email: dongarra@cs.utk.edu**
 - ⌞ Room: 413, Claxton
 - ⌞ Phone: 974-8295
- ◆ **Office hours:**
 - ⌞ Wednesday 11:00 – 1:00, or by appointment
- ◆ **TA:**
 - ⌞ Room: , Claxton
 - ⌞ Phone: 974-

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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 and monitoring
 - ⌞ Debugging parallel programs
 - ⌞ 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

- ◆ **Book:**
 - ⌞ [The Sourcebook of Parallel Computing](#). Edited by Jack Dongarra, Ian Foster, Geoffrey Fox, William Gropp, Ken Kennedy, Linda Torczon, Andy White, October 2002, 760 pages, ISBN 1-55860-871-0, Morgan Kaufmann Publishers.
- ◆ For each lecture a 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/cs594-2003.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 one of our set of computer clusters. More on this later
- ◆ If you have an account in the Department you have access to the TORC cluster: torc1 through torc8.
- ◆ Cluster of PC's:
 - ↳ <http://icl.cs.utk.edu/internal/iclhelp/clusters.html>

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