

Computer Science 635
Parallel Computer Architecture

3 Credits, Spring 2005

Tues, Thurs 9:30 – 10:45 A.M. Room: ECS 2120

Schedule number 29691

Prof. Alex Pothen
pothen@cs.odu.edu, 683-6391,
2122 ECS, Old Dominion University

Syllabus

The U.S. federal agencies are beginning a major effort to revitalize the development of massively parallel computers and parallel algorithms for solving large-scale computational science problems. The Computational Science group in the Computer Science department at ODU has a 128 processor PC cluster with a state of the art infiniband communications network, and also has access to Sun E10K Starfire parallel computer with 64 processors available at OCCS.

There is a demand for computer scientists who are trained to develop scalable parallel algorithms and software for solving large-scale scientific computing problems. The application of parallel computing to datamining problems for homeland security and bioinformatics are currently growing applications.

The availability of powerful parallel computers provides creative opportunities for computer scientists to study these architectures and to design new algorithms and software for these machines. CS 635 is designed to train students to take advantage of the opportunities for “Parallel computing in the 21st century” by providing an introduction to the design of parallel computers, programming them for high performance, designing algorithms that are scalable, designing interconnection networks, and organizing caches that are effective on parallel computers.

Textbook

The textbook for the course is “Parallel Computer Architecture” by David Culler, J. P. Singh, and Anoop Gupta, Morgan Kaufmann, 1999 (ISBN 1-55860-343-3). I will also make use of supplementary materials in the course, and will either give you notes or postscript or pdf files for the same. This semester I intend to make use of articles from a recent overview of parallel computing, “Sourcebook of Parallel Computing”, edited by Jack Dongarra, Ian Foster, Geoffrey Fox and others, Morgan Kaufmann Publishers, 2003.

I will make course material including syllabus, homework, and any announcements available on the Web. The course URL is www.cs.odu.edu/~pothen/Courses/CS635.

Topics to be covered

I intend to cover portions of the first seven chapters of the textbook, selections from other chapters, and some supplementary material from other sources. Students will be asked to write parallel programs to run on the PC cluster and the Sun Starfire, using MPI and OpenMP communication libraries.

Grading

Students will receive regular Homework problems, and there will be a final examination in the course. Students will be expected to work on a project, which could include identifying and solving a small research question; reading a paper, writing a report on it, and/or presenting it to the class; a programming project; performance evaluation of parallel computers using hardware and software tools; or any other work that the student and I agree would be suitable.

Academic Integrity

I expect all students to abide by the ODU honor code. All work that you submit for grading should be your own. It is NOT appropriate for you to solve a problem together with some one else, write up a common solution, and then submit separate answers. You should also cite any sources that you use in your work. If you have questions whether a collaboration or discussion would be inappropriate, please ask me for clarification.