



Cluster Computing at UNCC

Regular Parallel Computing Catalog Course

Department of Computer Science has an regular undergraduate/graduate level catalog course:

CSCI 5145* Parallel Computing. Prerequisites: CSCI 1202 and CSCI 3182 or consent of department. Types of parallel computers, programming techniques for multiprocessor and multicomputer systems, parallel strategies, algorithms, and languages

which has been taught for about 10 years using a cluster of workstations, and offered every year.

*Numbering may be CSCI 3145 for only undergraduates, or CSCI 4145 for undergraduates in the same class as a graduates.

Course Home page

<http://www.cs.uncc.edu/~abw/CSCI3145>

Course Contents

Closely follows textbook in order.

Chapter 1 Parallel Computers

Chapter 2 Message-Passing Computing

Chapter 3 Embarrassingly Parallel Computations

Chapter 4 Partitioning and Divide-and-Conquer Strategies

Chapter 5 Pipelined Computations

Chapter 6 Synchronous Computations

Chapter 7 Load Balancing and Termination Detection

Chapter 8 Programming with Shared Memory

Chapter 9 Sorting Algorithms

Chapter 10 Numerical Algorithms

Chapter 11 Image Processing

Chapter 12 Searching and Optimization

May not cover all this



Usually do not get to this



Other Parallel Computing Courses

CSCI 6010 Distributed Shared Memory Programming

Offered in Fall 2000 as a special graduate level topics course on distributed shared memory programming.

Senior/thesis projects

Samples available to examine

“Comparison of PVM and MPI for Solving 3-Dimensional Jacobian Iteration Problem,” S. D. Blackburn, 1995. (Independent study)

“Parallel Processing,” D. Hicks, 1999. Numerous parallel algorithms examined.

“Hough Transform,” S. H. Im, 1998. Parallelizing the Hough Transform.

Course Home page

<http://www.cs.uncc.edu/~abw/CSCI6010>

UNCC Parallel Computing Home pages

Original

http://www.cs.uncc.edu/par_prog

New

Much better step-by-step instructions, currently at:

<http://www.parprog.f2s.com>

IEEE Task Force on Cluster Computing Education Page

Maintained at UNCC

<http://www.cs.uncc.edu/~abw/parallel/links.html>

NSF Funded Cluster Computing Projects in Department of Computer Science at UNCC

- 1996-1998 "Introducing Parallel Programming Techniques into the Freshman Curricula," NSF DUE 9554975, PI: A. B. Wilkinson (Co-PI M. Allen), \$114,975.
Project to introduce parallel programming into freshman year.
- 1999-2001 "Parallel Programming on Workstation Clusters," NSF DUE 9950309, PI: A. B. Wilkinson, \$100,194.
Project to develop distributed shared memory materials.
- 2001 "Cluster Computing Workshop," NSF DUE 0119508, PI: A. B. Wilkinson - this three-day work shop on teaching cluster computing.

NSF may fund another workshop (subject to funds available) in 2002.

Results/deliverables of 1996-98 NSF Project

- Textbook published for undergraduate parallel programming using clusters. **First such textbook.**
- Parallel programming course broadcast from UNCC several times over the NCREN televideo network to several NC universities including NC State University, UNC-Wilmington, UNC-Asheville, UNC-Greensboro, Described in IEEE Trans. on Education, 1998.
- Extensive home page for educators including complete on-line parallel programming course with real-audio.

Other Parallel Computing Books

Clusters

R. BUYYA (ED.) (1999), *High Performance Cluster Computing Vol. 1, Architecture and Systems*, Prentice Hall PTR, Upper Saddle River, NJ.

R. BUYYA (ED.) (1999), *High Performance Cluster Computing Vol. 2, Programming and Applications*, Prentice Hall PTR, Upper Saddle River, NJ.

G. F. PFISTER (1998), *In Search of Clusters 2nd edition*, Prentice Hall PTR, Upper Saddle River, NJ.

Related

Example:

FOSTER, I. (1995), *Designing and Building Parallel Programs*, Addison-Wesley, Reading, Massachusetts.

Parallel Algorithms

Combining with sequential algorithms:

BERMAN, K. A., AND J. L. PAUL (1997), *Fundamentals of Sequential and Parallel Algorithms*, PWS Publishing Company, Boston, Massachusetts.

MILLER, R. AND L. BOXER (2000), *Sequential and Parallel Algorithms, a Unified Approach*, Prentice Hall PTR, Upper Saddle River, NJ.

Other

JÁJÁ, J. (1992), *An Introduction to Parallel Algorithms*, Addison Wesley, Reading, Massachusetts.

KUMAR, V., A. GRAMA, A. GUPTA, AND G. KARYPIS (1994), *Introduction to Parallel Computing*, Benjamin/Cummings, Redwood City, California.

BERTSEKAS, D. P., AND J. N. TSITSIKLIS (1989), *Parallel and Distributed Computation Numerical Methods*. Prentice Hall, Englewood Cliffs, New Jersey.