CSc 422/522 — Parallel and Distributed Programming

Spring Semester, 2000

Instructor

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Office Hours: Monday 2:00-3:30, Tuesday 3:30-4:30, and by appointment

Teaching Assistant

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Textbooks

Foundations of Multithreaded, Parallel, and Distributed Programming, Addison-Wesley, 2000
The SR Programming Language: Concurrency in Practice, Benjamin/Cummings, 1993

Tentative Lecture Schedule

1. Concurrent programming concepts; overview of course
2. Introduction to the SR programming language
3. Concurrent execution in SR
4. Techniques for parallelizing programs
5. Synchronization, atomic actions, and await statements
6. Semantics of concurrent programs; interference; safety and liveness
7. Critical sections: spin locks
8. Critical sections: fair solutions
9. Barriers: basic concepts and data parallel programs
10. Barriers: counters, flags, symmetric barriers
11. Parallel programming: concepts, speedup, examples
12. Parallel programming project: assignment and advice
13. Semaphores: mutual exclusion, signaling, resource counters, dining philosophers
14. Semaphores: readers/writers, passing the baton
15. Semaphores: scheduling policies; Pthreads library
16. Implementations: kernels, multiprocessors
17. MIDTERM 1

— *Spring Break*

18. Monitors: signaling disciplines, synchronization techniques
19. Monitors: larger examples; use in Java; use in Pthreads
20. Message passing: concepts, filters, clients and servers
21. Message passing: more clients and servers
22. Message passing: interacting peers; the MPI library
23. RPC and Java RMI; rendezvous and the Ada language
24. Multiple primitives; the full SR language
25. Programming multithreaded, distributed systems
26. Implementations: distributed kernel, distributed shared memory
27. Distributed parallel computing: manager/workers paradigm; Linda
28. Distributed parallel computing: heartbeat and pipeline paradigms
29. MIDTERM 2
30. Decentralized computing: broadcast and token-passing paradigms

Assignments and Exams

Homeworks (4): 40 points each for undergrads and honors students, 60 for grads
Midterms (2): 60 points each for undergrads, 75 for grads and honors students
Projects (2): 40 points each for undergrads, 60 for grads and honors students

The total for all assignments and exams is 360 points for undergrads, 430 points for honors students, and 510 points for graduate students.

Your final grade will be determined by how well you do relative to your peer group. If you get at least 90% of the possible points, you will get an A; if you get at least 80% you will get a B; and so on. The final lines might be drawn slightly below these levels.

Tentative Schedule of Assignments

HW 1a	assign 1/20	due 2/1
HW 1b	assign 1/27	due 2/8
HW 2	assign 2/10	due 2/22
Parallel Project	assign 2/22	due 3/7 (programs) and 3/23 (reports)
HW 3	assign 3/23	due 4/4
HW 4	assign 4/6	due 4/18
Distributed Project	assign 4/13	due 4/20 (proposal) and 5/9 (demo or paper)

Policies

You are responsible for all material covered in lectures.

You may discuss assignments with classmates, but all work you turn in must be your own. If in doubt, refer to the University's "Code of Academic Integrity" or ask the instructor.

Assignments must be turned in during class on the dates they are due, unless you have received permission *in advance* for an extension. Examinations must be taken in class on the date they are given, unless you have received permission *in advance.*

Accounts and Electronic Resources

If you do not already have an account on Lectura, apply for one immediately. Later in the term you will be given accounts on parallel and distributed machines.

Email. Send email to (or see) the instructor when you have questions about the lectures, homework assignments, grading etc. We will later establish a class-wide email list so that we can quickly communicate with all of you.

Home Directory. The home directory for the class is `/home/cs522`. Copies of handouts, programs, and other information will be stored there.

Web Home Page. The home page for the class contains course-related information, including information on SR and Postscript copies of all assignments. It is reachable by either of the following URLs:

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http://www.cs.arizona.edu/classes/cs422/
http://www.cs.arizona.edu/classes/cs522/
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