Software Eng. 4F03 - Design of Parallel/Distributed Computer Systems and Computations

INSTRUCTOR:
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Office Hours: Thursday 15:00-16:00.

LECTURES:

- Location: HH/104
- Time: Monday, Wednesday, Thursday 13:30-14:20.

  Note: Information will sometimes be sent to your mcmaster.ca e-mail accounts. It's your responsibility to check this account regularly.

TUTORIALS: Fri 9:30-10:20, ABB/165. The date of first tutorial will be announced in class.

OVERVIEW:

In this course, we will study the design of multi-computer systems for computation-intensive applications, and, array processing systems. We will start by studying high performance RISC processors, and their components such as memory subsystems, superpipelined execution units, and speculative computation units. In particular, we'll examine how they affect software performance.

We'll then examine shared memory multiprocessor systems and distributed message-passing systems. We examine their communication methods, and how to determine performance criteria for parallel programs running on them. We will learn to write parallel and distributed programs using the Pthreads and MPI libraries.

Finally, we will examine the application of multi-computer systems to graphics systems, image processing, sorting, matrices, simulators, and optimization problems.

GRADING SCHEME:

- Assignments 15%
- Midterm 35%
- Final Exam 50%

TEXT:

B. Wilkinson and M. Allen, *PARALLEL PROGRAMMING. Techniques and Applications Using Networked Workstations and Parallel Computers, 2nd edition*, Prentice-Hall, 2005, 1999.

The course will cover most of Part I (Chapters 1-8), and selected examples from Part II (matrix multiplication, smoothing, sharpening and noise reduction, genetic algorithms), as time permits. Programming will be performed in the Solaris and/or Linux environment(s), using 'C', pthreads, and MPI.

REFERENCES:

K. Dowd and C. Severance, *High Performance Computing, 2nd Ed.*, O'reilly, 1998.
B. W. Kernighan and D. M. Ritchie, *The C Programming Language, 2nd Ed.*, Prentice Hall, 1988.
B. Nichols, D. Buttlar, and J. Proulx Farrell, *Pthreads Programming*, O'reilly, 1996.
W. Gropp, E. Lusk, and A. Skjellum, *Using MPI. Portable Parallel Programming with the Message-Passing Interface, 2nd Ed.*, MIT Press, 1999.

NOTE: You will not be required to know any material from the references beyond what is presented in class, unless taught previously in a required course.

NOTES:

Discrimination

"The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact there Chair, the Sexual Harassment Office or the Human Rights Consultant, as soon as possible."

Academic Dishonesty

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

NOTE: every instance of academic dishonesty wil be reported to the Office of Academic Integrity. Subsequent instances in any course will be treated as a repeat instance, likely resulting in loss of credit with a notation on the transcript, and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at **http://www.mcmaster.ca/senate/academic/ac_integrity.htm**.

NOTE: appendix 3 contains many examples, but not all possible examples. If your actions match the definitions of academic dishonesty given in the above web site, it will be considered an instance of academic dishonesty.

The following illustrates only fiur forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained. An example is copying all or part of someone's assignment and handing it in as your own. Unless the instructor has specifically given you permission to use a source (and you cite the source), then assume that use of said source would be academic dishonesty.

2. Improper collaboration in group work.

3. Copying or using unauthorized aids in tests and examinations.

4. Intentionally aiding or attempting to aid another student to commit academic dishonesty, is also an act of academic dishonesty.