Essentials: Communication, Content, and Structure

Communications

Class Meetings:	Monday, Thursday 13:10 - 14:25, Room C107HN
Office:	HN1090J
Office Hours:	Thursdays, 10:30 - 12:30
Email:	stewart.weiss@hunter.cuny.edu
Telephone:	(212) 772-5469

Resources

Textbooks: Michael J. Quinn. *Parallel Programming in C with MPI and OpenMP*. McGraw Hill, 2004. ISBN 0-07-282256-2.

Computing Facilities: All registered students will be given user accounts on the Computer Science UNIX network unless they already have one. These accounts provide access to all UNIX hosts in the network, including those in the 1000G lab on the tenth floor of Hunter North. This lab is available 24 hours a day, 7 days a week, to students enrolled in selected courses. The accounts also enable students to login to the network remotely using an ssh client.

Website: All course materials, including lecture notes, slides, assignments, syllabus, and other resources, including this document, are posted on my website, at `http://www.compsci.hunter.cuny.edu/~sweiss/course_materials/csci493.65/csci493.65_spr15.php`

Prerequisites

CSci 235 and Math 160 or permission of the instructor.

Departmental Learning Goals

Material in this course supports the following departmental learning goals: 1a: (understanding the basic foundations and relevant applications of mathematics and statistics, particularly those branches related to computer science) through performance analysis of various software design choices; 1b: (understanding the relationship between computer architecture and software systems) by discussing how hardware supports parallel algorithms and how software can be mapped to different types of hardware; 3a: (ability to communicate ideas effectively) by requiring homework that is graded in part on clarity and proper use of the English language. This course fulfills GER 3/B requirement.

Course Objectives and Content

Specific learning objectives of the course are that, after completing the course successfully, the student should be able to:

1. Write a correct and scalable parallel algorithm using both a message-passing based paradigm (MPI) and a shared-memory based paradigm (OpenMP).
2. Read and analyze a program using MPI and/or OpenMPI.

3. Parallelize a serial algorithm by applying task-based decomposition
4. Parallelize a serial algorithm by applying data-parallel decomposition.
5. Determine the speed-up, efficiency, and scalability of a parallel system.
6. Discuss the concept of parallel processing and the relationship between parallelism and performance.
7. Appreciate the need to express algorithms in a form suitable for execution on parallel processors.
8. Explain the basic types of parallel architectures and interconnection networks.
9. Characterize the kinds of tasks that are a natural match for SIMD machines and those more suited to SMP architectures.
10. Explain how various Monte Carlo methods work.

About C and C++ in This Course

Although both MPI and OpenMP support parallel programming in both C and C++ (as well as Fortran77 and Fortran90), most of the programming examples that I use and all that appear in the textbook are written in C. Some students have a knee-jerk reaction when they hear this, thinking, "but I don't know C." This is not quite true. The C++ language contains most of the C language. If you know C++, you know a great deal of C. There are minor differences that arise in the syntax of declarations (such as structure and function declarations), but the real problem is that most students never learn how to use the C standard libraries. Most students learn C++ stream I/O and never bother to learn what seem to them like archaic functions of the C standard I/O library. These functions are at times much more useful than any found in C++. In general, you ought to know some C, as a student of computer science, because there are things you can do much more easily and quickly in C than with C++. You will be free, however, to use C++ when writing code in the course, if that is your preference.

Assignments, Exams, and Grading

This is an honors seminar, not an ordinary lecture-style class. For this reason, students are expected to be self-motivated and self-disciplined, and are expected to do all of the assigned reading. The final grade is based upon a weighted average of the following components: class participation (10%), homework grades (80%), and an on-line final exam (10%).

Assignments. There will be several assignments, some conceptual, some programming projects of varying sizes. In all cases, the work is to be yours alone; working in groups is not allowed, unless the assignment states otherwise. ***Assignments must be submitted on time and will not be accepted after their due dates.*** Conceptual assignments will be like the exercises at the ends of the chapters in the textbook. The exact number of assignments is to be determined, but the student should expect no fewer than three programs and no more than six. Programs must comply with the rules specified in the document `http://www.compsci.hunter.cuny.edu/~sweiss/course_materials/csci493.66/programming_rules.pdf`. Please read it carefully.

Final Exam. There will be a Blackboard-based, multiple choice, final exam at the end of the semester.

Incomplete Grades

I do not give "incomplete" (IN) grades except to those students who, for legitimate, documented medical or personal reasons, have not been able to complete one or two assignments. I will not give an IN grade to someone who has not submitted more than this amount of work.

Class Calendar and Important Dates

The last day to drop a class without a "W" is February 17. The last day to withdraw is April 16. There are no classes on February 12, February 16, nor during the spring recess from April 3 through April 11. Wednesday, February 18 follows a Monday schedule so we meet on that day. The last day of class is Thursday, May 14.

Course Materials, the Web, and Blackboard

All lecture notes will be posted on the course's home webpage, which does not require special privileges to access. Grades will be posted in the grade center on Blackboard. For the purpose of discussions and course-related questions, the class has a Google group with the following essentials:

Name:	`hc_csci49365_spr15`
Home page:	`http://groups.google.com/group/hc_csci49365_spr15`
Email address:	`hc_csci49365_spr15@googlegroups.com`

If you do not have a Google email address, you will not be able to post to this group, so I suggest that you obtain one on or before the start of classes. The Google group will be the means by which to ask and answer questions related to the course. I require that you use the following protocol if you have a question:

1. Check whether the question you want to ask has been posted and answered in the Google group.
2. If it has been answered, you are finished. If not, send the question to the Google group.
3. Anyone in the group can answer the question. If no one else answers the question, I will post an answer to it.

I will ignore any non-personal questions sent to my Hunter email address. Personal questions (such as a question about a grade or missing a class) should be sent via private email to my Hunter email address, not to the Google group.

Academic Honesty

Unless I state otherwise, all assignments and projects are to be your work alone. If someone else does part of this for you, it is considered to be academic dishonesty. Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. In this class, I will enforce the University's Policy on Academic Integrity and bring any violations that I discover to the attention of the Dean of Students Office.

ADA Compliance

In compliance with the *American Disability Act of 1990* (ADA) and with *Section 504* of the *Rehabilitation Act of 1973*, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (emotional, medical, physical an /or learning) consult the *Office of AccessABILITY* located in Room E1124 to secure necessary academic accommodations. For further information and assistance, the student can call (212-772-4857)/TTY (212-650- 3230).