

CSCI-GA.3033-009
Multicore Processors: Architecture and Programming
Spring 2016

Instructor: Mohamed Zahran
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Meeting time: Wednesdays 5:10 -7pm
Meeting place: WWH 1302
Office hours: Tuesdays 2:00 – 4:00pm (WWH 320)

Text

There is no required textbook. Reading material, from research papers, will be posted on the course web site, in addition to the lecture slides.

Course Description

The tremendous advances in process technology have created a revolution both in hardware and in software. On the hardware side, we moved from single core processors to multicore/manycore processors. Multicore chips are now everywhere. You can find them in smartphones, playstations, notebooks, all the way up to supercomputers. To benefit from these chips, software must be parallelized, which starts another revolution in software.

The purpose of this course is to introduce you to both the hardware advances and parallel programming targeting multicore and manycore processors. You will learn how to make the best use of the underlying hardware to build applications that can take advantage of the on-chip parallelism.

I also hope that this course helps you to build a vision on where the software and hardware are heading in the future and how they are interacting.

Course Goals

- Understand the shift from single core to multicore processors
- Understand how the multicore revolution affects software development
- Learn about parallelism and concurrency

- Understand the different parallel programming models
- Think in parallel!
- Measure parallel program performance
- Learn how to make the best use of the underlying hardware

Syllabus

- The Multicore/manycore revolution
- Parallelism and concurrency
- The memory hierarchy
- Coherence and consistency models
- Parallel programming models
- Parallel programming languages
- Performance evaluation
- Heterogeneous multicore
- Hardware constraints

Grading

- Programming assignments: 25%
- Homework assignments: 25%
- Project: 50%

Note: If you have a documented disability and wish to discuss academic accommodations with me, please contact me as soon as possible.

Feedback: I would like as much feedback/criticisms as possible from you, as early as possible, so that I can try to improve the way the course is taught. Please feel free to give me any suggestions (anonymously if you wish) that you think could improve the way the course is handled. Keep in mind that you are not alone. If you have a question, undoubtedly others do too; and we will all benefit from your input. Do not be shy to ask about anything you do not understand in the course.

Good Luck and Have fun!