ECE454H1F Computer Systems Programming

Overview

This course goes beyond prior programming courses to teach students to better understand computer hardware, operating systems, and compilers from a programmer's perspective. In particular this course leverages this improved understanding to allow students to program for good performance. Students will learn how to measure and understand program execution and behavior, how to get the most out of an optimizing compiler, how memory is allocated and managed, and how to exploit caches and the memory hierarchy. Furthermore, students will learn about current trends in multicore, multithreaded, and data parallel hardware, how to exploit parallelism in their programs, the fundamentals of parallel architectures and synchronization techniques, and the recent trend of distributed data analytics (e.g., big data analytics)---these latter topics are relatively new to undergraduate curricula and in increasing demand in industry. Students will get hands-on experience with most topics through programming assignments.

Course Website

Please login to the University's Portal and then select `COMPUTER SYSTEMS PROGRAMMING`

Optional Textbook (not required)

1. Computer Systems: A Programmer's Perspective, Randal E. Bryant and David R. O'Hallaron. Prentice Hall, 2003, ISBN 0-13-034074-X.

Evaluation Scheme

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    Percentage Component
1       35%   Labs
2       25%   Midterm Exam
3       40%   Final Exam

    Homework breakdown:
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25% HWs

Course Outline

- Introduction
- CPU Architecture
- Profiling
- Compilers and Optimizations
- Static Memory
- Memory Performance
- Dynamic Memory
- Parallel Architecture
- Threads and Synchronization
- Parallelization
- Big data analytics & cloud computing