MW 2-320, SPRING 2016

EE/CS 451: PARALLEL AND DISTRIBUTED COMPUTATION

The course will focus on broad principles of parallel and distributed computation. The Lab associated with the course will illustrate the principles through parallel programming examples.

INSTRUCTOR: VIKTOR K. PRASANNA

Prerequisite: (EE 357 or EE 352) or consent of the instructor.


Course Grade: based on home works, parallel programming assignments, midterm(s), and final.

Course Outline:
1. Introduction (1): Architectural advances, technology perspectives, motivating examples, challenges.
4. PRAM and Data Parallel Algorithms (4): 1. PRAM model of computation, Brent’s theorem, various models, illustrative examples. 2. Max, Scan operations. 3. Recursive doubling, graph algorithms. 4. Sorting. 5. Performance analysis, scalability. 6. FFT.
5. Basic Communication Primitives (4): 1. Broadcast and all to all, communication costs on various topologies. 2. Personalized communication. 3. Reduce, prefix sum and scatter and gather. 4 Graph embeddings.
8. Data Parallel Programming Abstraction of GPUs (2): 1. GPU architecture, SIMT execution model, CUDA programming model. 2. Illustrative examples and application mapping, optimizations, OpenCL.
Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism - presenting someone else's ideas as your own, either verbatim or recast in your own words - is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct/.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu/ or to the Department of Public Safety http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety whole USC community. Another member of the university community - such as a friend, classmate, advisor, or faculty member - can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information http://emergency.usc.edu/ will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.