Syllabus: Parallel Computing

For the 2016-2017 School Year

Contact Information

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Course materials are at academics.tjhsst.edu/compsci/parallel and no login is required.

Fall Semester

Students study parallel programming and visualization in a variety of contexts with an emphasis on industry-standard tools. Topics include Huffman compression, percolation, parameter search, Monte Carlo methods, fractal generation and cellular automata. Most problems are the so-called embarrassingly parallel type. The programming language is C using both MPI and 2-D OpenGL.

Spring Semester

Students study parallel programming and visualization in a variety of contexts with an emphasis on underlying and experimental technologies. Topics include orbital mechanics and the N-Body problem, graphics rendering via ray tracing and relaxation methods toward a steady-state. The programming language is C using both MPI and 3-D OpenGL. Additional tools and environments include OpenMP, pthreads, sockets, and Nvidia's CUDA for GPGPU.

Tentative Schedule

Month	*Topic*	*Lab*
September	Indirect Addressing	Huffman Compression
October	Scaling Up the Grid Size	Forest Fires
November	Spatial Decomposition	Critical Probability
		Mandelbrot Set
December		Julia Sets
January	Nearest Neighbor Coupling	Conway's Game of Life
February	Shared Memory Model	Ray Tracing
March	Fine-Grain Parallelism	XMT
April	All Pairs Coupling	N-Body
May	Graphics Card Programming	Matrix Solvers
June	Optimized Communication	Map Reduce

Source code will be due the third and seventh weeks of each quarter.
Lab reports will be due the fifth and ninth weeks of each quarter.

Grading

Two quarter grades will be weighted evenly in calculating the final grade for each semester. Each quarter's assignments will be weighted 20% first code turn-in, 20% second code turn-in, 25% first lab report, 20% second lab report, and 15% quizzes.

The first lab report may be revised per the retake policy. This revision is optional and only available if the initial report scores below 80%. Students exercising this option will receive the highest grade, but no revision will score higher than 80%. No formal request or corrective action is required other than submission of the revised report.

Late submission of any assignment will be penalized not more than 50% until the end of the quarter, then and thereafter incurring a 100% penalty.

Textbook

The textbook is Lin and Snyder, Principles of Parallel Programming. The ISBN is 0-321-48790-7 and the cost is eighty-five dollars. Students may check out a book if they like.

Statements

There is no extra credit. There is no homework. The lab provides all necessary equipment. Mobile devices may not be used during class without permission, including hallways; otherwise the device may be confiscated.

Student Advocacy

Students should consult the TJHSST Student Advocacy Brochure to be found at...

www.tjhsst.edu/abouttj/integrity

...and are encouraged and invited to discuss these issues with their instructor.

Plagiarism

Honesty and academic integrity are important values of the TJ community. No person should feel the need to take ethical shortcuts. This class strongly encourages collaboration, meaning a discussion among students about problem solving approaches. It is not acceptable to work together to generate identical code. A student who is helping may look at another student's code to aid in debugging, but a student who is being helped should not read code written by other students. Plagiarism, which means copying code in whole or in part, from a student or from the Internet, is an academic offense with consequences. Students' code will be checked with plagiarism detection software. The teacher is required to report plagiarism to the student's grade level administrator, counselor, and parents.