CS-273 Foundations of Parallel and Network computing.

Course Information: Spring 2003.

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Lectures: Monday and Wednesdays 10:30-12:00 in 405 Soda Hall;

Web page: http://www.cs.berkeley.edu/~satishr/cs273/index.html. Lecture notes, homeworks and other documents will be posted here. Use this as a source for handouts.

Brief Overview

Fundamental theoretical issues in designing algorithms and architectures for the parallel computing and problems in the internet.

Shared memory models of parallel computation. Parallel algorithms. Routing algorithms for networks like hypercubes, meshes and butterfly. Contention resolution.

Fundamentals of routing for general networks. Algorithms for object location in distributed networks.

Game theoretic aspects of distributed agents.

Readings.

Will be posted on the webpage.

Notes

We will have scribe notes. **Warning**: these notes will often be quite sketchy, and are **not** a substitute for attending the lectures.

Prerequisites

You should have taken an Upper Division course on algorithms (CS-170 or equivalent.)

Topics.

- Load Balancing. Contention resolution.
- PRAM model: Algorithms. Connected Components, P-completeness, straightline code.
- PRAM implementation. Hashing. Routing, combining in fixed connection networks. Ranade's routing/scheduling algorithm.
- More Network topics. Path selection, packet scheduling. Permutation routing. Switch scheduling for stability. (possible)
- Agents, resources, and incentives. Concepts from Game Theory and Economics. Game-theoretic analysis of network protocols.
- Topics in distributed computing. Leader election. Routing with local information. Object location data structures for wide area networks.

Assessment

Each of you is required to produce two sets of scribe notes for a lecture.

The course will have problem sets and a final. The grade will be based 40% on problem sets and 40% on a final and 20% on your scribe notes.

Welcome to the course!