

EE 276

Spring 2013

**San Jose State University
Department of Electrical Engineering**

Course Title:

Topics in Parallel Architectures

Meeting: Section 1: T Th 18:00 -19:15, ENG 329

Instructor:

Dr. Tri Caohuu, ENG 375
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Course Outline:

This class is intended for researchers and graduated engineers in the area of parallel computer architectures, hardware and software. The topics vary from semester to semester covered various areas of parallel computation including performance metrics, shared memory computer, snoop-based multiprocessor design, directory-based cache coherence, multi-core architecture, scalable multiprocessors, interconnection network, and GRID computing. Hardware/software trade-offs will be discussed when appropriate.

The topic in focus for this semester, Spring 2013, is multi-core architecture. There will be a term project be developed and presented by students on selected topics.

Reference:

1. "Parallel Computer Architecture
A Hardware/Software Approach"
Culler and Singh, Morgan Kaufmann:99
2. "Professional Multi-core Programming: Design and Implementation for C++
Developer", Cameron Hughes and Tracy Hughes, Wiley:08
3. Notes and Hand-out

Grading policy:

Homework	10%
Midterm	25%
Project	25%
Final Exam	40%

Office Hour:

15:00 to 17:0 TTh or by appointment

Course Outline

1. Introduction

Article: "Amdahl's Law in the Multi-core Era"

2. Coherent Cache

- 2.1 Cache Memory
- 2.2 Snoop-based Multiprocessor Design
- 2.3 Coherent Cache Protocols
- 2.4 Directory-based Cache Coherence
- 2.5 Multi Level Cache System
- 2.6 Cache Performance

Article: "Performance of Cache Memory Subsystems for Multi-core Architectures"

3. Multi-core Architectures

- 3.1 Multi-core architecture
- 3.2 Multi-core vs SMT
- 3.3 Commercial Processors: Intel, AMD, SUN
- 3.4 Open issues

Article: "Multi-core architecture"

4. Multi-core Programming

- 4.1 Operating System Scheduling on multi-core architecture
- 4.2 Multithreading
- 4.3 Communication and synchronization between tasks
- 4.4 Open MP and MPI

Article: "Optimization: Operating System Scheduling on multi-core architecture"

Article: "Work-share Process of Thread Programming and MPI Model on Multi-core"

5. Term Project

Project Presentation: May 9th

Final Exam: Thursday, May 16th, from 17:15 to 19:30