

**EE 276**

**Spring 2007**

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

*Course Title:*

Topics in Parallel Architectures

*Meeting:* Section 1: T Th 18:00 -19:15, ENG 336

*Instructor:*

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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 covered include performance metrics, shared memory computer, snoop-based multiprocessor design, scalable multiprocessors, directory-based cache coherence, interconnection network, and GRID computing. Hardware/software trade-offs will be discussed when appropriate.

There will be a term project be developed and presented by students on selected topics. This semester we will focus a project with dual core embedded system.

*Text books:*

1. "Parallel Computer Architecture  
A Hardware/software Approach"  
Culler and Singh, Morgan Kaufmann:99
2. Notes and Hand-out

*Grading policy:*

Homework	10%
Midterm	25%
Project	30%
Final Exam	35%

*Office Hour:*

14:30 to 16:30 TTh or by appointment

## **Course Outline**

1. Introduction
2. Performance Metrics
  - 2.1 Parallel Programs
  - 2.2 Programming for Performance
  - 2.3 Workload-Driven Evaluation
3. Shared Memory Multiprocessors
4. Snoop-based Multiprocessor Design
5. Scalable Multiprocessors
6. Directory-based Cache Coherence
7. Hardware-Software Tradeoffs
8. Interconnection Network Design
9. Latency Tolerance
10. GRID Computing
11. Future Directions
12. Class Project

**Project:** Dual Core Embedded System

Embedded FPGA System

- Introduction to Embedded FPGA
- Trade off between FPGA and Conventional System
- Design Considerations
- Tool: EDK

Embedded FPGA Design Architecture

- Hardware:
  - Processor Architecture (PowerPC/Microblaze)
  - Bus Architecture (OPB/LPB)
  - Peripheral (EMC, UART, GPIO, etc...)
  - Custom IP
- Software:
  - RTOS and Driver
  - Software Application

Embedded FPGA Design Flow

- Design System Architecture
- Custom Driver
- Software Application
- Integration and Download
- Debugging

Design Project

Virtex PRO II specifications  
Specific project application