

Engineering 9869

Advanced Concurrent Programming

Introduction

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¹Throughout this course I will be borrowing from Dr. Theo Norvell

What is Concurrent Programming?

Concurrent Program: When two or more 'processes' cooperate to achieve a common goal.

- Multiple threads of control
- Inter-process Communication
 - Shared variables
 - Message passing
- Synchronization
 - Mutual exclusion — processes must execute their *critical sections* one at a time.
 - Conditional synchronization — processes wait until a condition is true.

Note: Concurrent programming does not require multi-processor.

Why Use Concurrent Programs?

- Faster processing (when ≥ 1 processor)
- More effective use of resources (e.g. disks)
- Easier to program (sometimes)
- Fault tolerance
- System is distributed

What's different about it?

- Program steps from different processes may be inter-leaved or concurrent.
- Need to consider other processes.
- Usual reasoning rules don't apply.
- Testing is never sufficient.

Course Outline (Approximate)

- Following text reasonably closely
- Programming will be done in Java

Topic	Lectures (Approx)
Architectures & Applications	2
Processes & Synchronization	3
Locks & Barriers	3
Semaphores	2
Monitors	3
Message passing	3
RPC & Rendezvous	2
Interaction Paradigms	3
Scientific Computing	4
Real-time systems	4
Model checking	3
Transaction processing	2

Evaluation & Deadlines

Item	Marks	Deadline(s)
Assignments	20%	Sep. 21, Oct. 5, Oct. 19, Nov. 23
Mid-term	10%	Oct. 10
Project	15%	Proposal Sep. 19; Due Nov. 16
Final exam	45%	TBA
Better of Midterm & Final	10%	