CS533 Concepts of Operating Systems

Jonathan Walpole
Course Overview
About the Instructor

Instructor – Jonathan Walpole
Professor at PSU
Research Interests: Operating Systems, Parallel and Distributed Systems
Course Overview

Based on ~30 research papers
- Read them carefully
- Submit a written review of each paper BEFORE class
- Update your review (but don’t resubmit) AFTER class

Class structure
- Lectures with guided discussion
- Integrated sequence of programming projects
- Assessment based on midterm and final exams

Course web page
www.cs.pdx.edu/~walpole/class/cs533/spring2017/home.html
Topics

Part 1: key concepts and building blocks
- multi-threading and concurrency
- event-based system design
- message passing and RPC

Part 2: Evolution of OS kernel designs
- system structuring using layers
- monolithic kernels with up-calls
- modular kernels and safe extensibility mechanisms
- virtualization
- exo-kernels
Topics

Part 3: concurrency on modern CPU architectures
- locking in real-world OS kernels
- scalable spin-lock designs for multiprocessors
- effects of compiler reordering on concurrent code
- hardware reordering, memory consistency models and memory barriers
- designing OS kernels for scalable concurrency
Project

Linux-based
C and x86-64 assembly language programming
Implement a user-level threads library
  - threads
  - context switching
  - scheduler
  - synchronization
  - concurrent programming
Grade Structure

Midterm exam - 50%
Final exam – 50%

Exams will contain questions relating to the papers, lectures and programming projects

Programming assignments will not be graded
Peer review and collaboration is encouraged!
Before Class 2

Visit the class web page

Read papers for class 1 and class 2
Submit paper reviews as directed on the class web site
Start looking at project assignment 1
Entrance Exam

CS533 requires foundational knowledge in OS and related topics
- Do you have it?
- If you don’t, you should take CS333, or my CS510 course next quarter, and pass it with a B or better, before coming back to CS533
- Depending on your programming background, you may also want to take CS201.