CS 854: Advanced Topics in Operating Systems

Instructor: Ali Mashtizadeh
Overview

Website: https://cs.uwaterloo.ca/~mashti/cs854-f17/

Piazza: https://piazza.com/class/j7aoc9b46mc6q6

Email: mashti@uwaterloo.ca

All handouts and lecture notes will be online
  Please print them yourselves
Prerequisites

Assume familiarity with C, UNIX, etc.

Have taken an undergraduate course in operating systems
Grading (tentative)

25% Class Participation
25% Paper Summaries/Presentation
50% Project/Peer Reviews

Expectations:
Everyone must present papers in this class
Everyone must read and be ready to discuss every paper
Paper Reading

Everyone must read every paper before class

Write ~1 page response due by email or in class
   Any key ideas and tools you could use in other work?
   Anything you agree/disagree with? Or would do differently?
   Any assumptions you think do not apply today?
Group Project

Choose a small sized research project that you complete in the term with a group of 2-3 people

Write a one page proposal with your teammates

You could build a prototype system, expand an open source project, or conduct an evaluation of an existing system
Course Topics

Synchronization & Multi-core
Language-driven Design
Security
Storage and File Systems
Virtual Machines
What is an operating system?

Provides abstractions for the programmer

Hides the details of hardware
   Manages hardware resources
   Providing higher level interfaces

Provides protection
   Prevent one process/user damaging another process/user's stuff
Why study operating systems?

Operating systems are a maturing field
  Most people use a handful of mature OSes: Windows, Mac OS, Linux, FreeBSD, etc.

Improving performance, power utilization, and security are all OS issues

Virtual machines, embedded devices, unikernels provide opportunities for rethinking operating systems again
Applications run as user-level processes
Kernel manages hardware resources and security
Applications typically call the kernel through “system calls”
Application/Kernel transition is called a “context switch”