Introduction

▪ Schedule
  • 13:30 – 14:45 (Monday), 12:00 – 13:15 (Wednesday)
  • Lecture room #400112, Semiconductor Bldg.
    #85777, Corporate Collaboration Center Bldg.

▪ Course homepage
  • http://csl.skku.edu/SWE3004S17/
  • Lecture slides, announcements, exam scores, projects, …
  • Don’t waste your time in i-Campus
About me

• Jin-Soo Kim (김진수)
  • Professor @ SW & CE & SSE Dept.
  • Computer Systems Laboratory
  • Operating systems, storage systems, embedded systems, distributed systems, …
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  • URL: http://csl.skku.edu/jinsoo
  • Tel: 031-299-4593
  • Office: Corp. Collaboration Center #85566 (5th floor)
  • Office hours: Monday & Wednesday
  • The best way to contact me is by email
What is an OS?

- Computer systems internals

![Diagram of computer systems components]

- Software
- Architecture
- Hardware
- Application

Operating Systems

System calls

CPU
Mem
I/O Devices
Why do we learn OS?

▪ To graduate?
▪ To make a new hardware up and running
▪ To make a better OS or system
  • Functionality
  • Performance/Cost
  • Reliability
  • Energy efficiency
▪ To design OS-aware hardware
▪ To understand computer systems better
▪ Just for fun!
### Where are we now?

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Prerequisites

▪ Courses
  • System Programming or equivalents: SWE2001, CSE2003, or SSE2030
  • Unix System Programming Experiment or equivalents: SWE2007, CSE3044, or SSE2033
  • Computer Architecture: SWE3005 or ICE3003

▪ Required skills
  • Fluent C programming
  • Intel x86 architecture & assembly programming
  • Basic knowledge of Unix/Linux systems
  • Reading a large, complex program
Textbook

- Operating Systems: Three Easy Pieces
  - Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau
  - Arpaci-Dusseau Books
  - December 2016 (Version 0.92)

  - Available (with several options) at http://ostep.org

  - Read Remzi’s great article at http://from-a-to-remzi.blogspot.com/2014/01/the-case-for-free-online-books-fobs.html
Why Three Pieces?

“… as Operating Systems are about half as hard as Physics.”

Chap. 1
A Dialogue on the Book
Old Textbook

- Operating System Concepts
  - Avi Silberschatz, Peter B. Galvin, and Greg Gagne
  - John Wiley & Sons, Inc.

Reference: General OS

- Modern Operating Systems
  - Andrew S. Tanenbaum
  - Pearson
Reference: Linux

- Linux Kernel Development
  - Robert Love
  - Pearson Education, Inc.
Reference: Windows

- Windows Internals (Part 1 & Part 2)
  - Mark E. Russinovich, David A. Solomon, and Alex Ionescu
  - Microsoft Press
Reference: Solaris

- Solaris Internals
  - Richard McDougall and Jim Mauro
  - Sun Microsystems, 2001
Reference: Computer Systems

- **Computer Systems: A Programmer’s Perspective**
  - Randal E. Bryant and David R. O’Hallaron
  - Pearson Education, Inc.
  - [http://csapp.cs.cmu.edu](http://csapp.cs.cmu.edu)
Course Plan

▪ Lectures
  • General operating system concepts
  • Case study: Linux, xv6

▪ Hands-on projects
  • Using xv6 instructional OS
Lectures: Topics

- Virtualization
  - Processes
  - CPU scheduling
  - Virtual memory

- Concurrency
  - Threads
  - Synchronization

- Persistence
  - Storage
  - File systems
Projects: xv6

▪ A teaching OS developed by MIT
  • Port of the Sixth Edition Unix (v6) in ANSI C
  • Runs on multi-core x86 systems

▪ Why moving on to xv6 (from Pintos)?
  • Code inherited from a real, historical OS!
  • Includes working user-level programs and libraries
  • Easier to install on modern Linux systems
  • Easier to extend
  • Easier to understand modern OSes such as Linux
Project Plan

- We are preparing 4 ~ 5 projects
- These will be individual projects
- You can use up to 5 slip days

Weekly lab session
- A separate class with a TA (mandatory)
- Project announcement
- Q & A
- Hints & helps
- Code review
- Oral tests, …
Grading Policy

- Class attendance: 10%
- Exams: 35%
  - Midterm: 15%
  - Final: 20%
- Projects: 55%
- Subject to change

- TA: Kisik Jeong (정기식)
  - E-mail: kisik.jeong at csl.skku.edu
  - Office: Corp. Collaboration Center #85533
Class Attendance Policy

▪ If you miss any of exams, you will fail this course
▪ Do not be late! You should be present in the lecture room when I take class attendance
▪ You can miss the class up to four times without any penalty
  • For excused absences as well
▪ There will be a (small) bonus for students who attend all the classes (subject to change)
Cheating Policy

▪ What is cheating?
  • Copying another student’s solution (or one from the Internet) and submitting it as your own
  • Allowing another student to copy your solution

▪ What is NOT cheating?
  • Helping others use systems or tools
  • Helping others with high-level design issues
  • Helping others debug their code

▪ Penalty for cheating
  • Severe penalty on the grade (F) and report to dept. chair
  • Ask helps to your TA if you experience any difficulty!
Summary

- Understanding OS is essential for a broad spectrum of computer systems
  - Embedded systems, Cloud computing, Distributed systems, ...

- It will be a (very) tough semester! Use your time wisely

- Please make sure if you’re ready to take this course

- Happy hacking!