

CS372
Introduction to Operating Systems

Professor Emmett Witchel

Department of Computer Sciences
The University of Texas at Austin

witchel@cs.utexas.edu

<http://www.cs.utexas.edu/~witchel/372>

54855 : TTh 12:30-2pm PAI 3.14

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Operating Systems In The News

◆ Facebook App Exposes Abject Insecurity
(08/23/09)

- Back in June, the American Civil Liberties Union published an article describing Facebook's complete lack of meaningful security on your and your friends' information. Now, a developer has written a Facebook 'Quiz' based on the original article that graphically illustrates all the information a Facebook app can get its grubby little hands on by recursively sweeping through your friends list... pulling all their info and posts, and showing it to you. What's more, apps can get at your information even if you never run the app yourself.

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Operating Systems In The News

- ◆ **FBI may scrap \$170 million project (01/13/05)**
 - Bureau officials told a news briefing that they expect to find that after four years in development their much-touted Virtual Case File system does not work. But they said a suitable replacement is commercially available.
- ◆ **Domestic spying (09/06/07)**
 - The Homeland Security Department scrapped an ambitious anti-terrorism data-mining tool after investigators found it was tested with information about real people without required privacy safeguards. The department has spent \$42 million since 2003 developing ADVISE.

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Operating Systems In The News

- ◆ **EMI Music launches DRM-free downloads (04/02/07)**
 - Apple's iTunes store to be the first online music store to sell EMI's new downloads
- ◆ **KeeLog cipher broken (08/23/07)**
 - KeeLoq is a cipher used by...Chrysler, Daewoo, Fiat, General Motors, Honda, Toyota, Volvo, Volkswagen, and Jaguar

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Operating Systems In The News

- ◆ **Amazon Pulls Purchased E-Book Copies of 1984 and Animal Farm (6/17/09)**
 - In a story just dripping with irony, Amazon Kindle owners awoke this morning to discover that 1984 and Animal Farm had mysteriously disappeared from their e-book readers. These were books that they had bought and paid for, and thought they owned. Apparently the publisher changed its mind about offering an electronic edition, and apparently Amazon, whose business lives and dies by publisher happiness, caved. It electronically deleted all books by George Orwell from people's Kindles and credited their accounts for the price. Amazon customer service may or may not have responded to queries by stating, "We've always been at war with Eastasia."

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Operating Systems In The News

- ◆ **No Handhelds in Census (04/33/08)**
 - The Census Bureau will tell a House panel today that it will drop plans to use handheld computers to help count Americans for the 2010 census, increasing the cost for the decennial census by as much as \$3 billion, according to testimony the Commerce Department secretary plans to give this afternoon.
- ◆ **Music keys frozen (08/31/08)**
 - As of August 31, 2008, we will no longer be able to support the retrieval of license keys for the songs you purchased from MSN Music or the authorization of additional computers. This doesn't just apply to the five different computers that PlaysForSure allows users to authorize, it also applies to operating systems on the same machine (users need to reauthorize a machine after they upgrade from Windows XP to Windows Vista, for example).

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Operating Systems In The News

- ◆ **Google announces video expansion (01/06/06)**
 - ...sell thousands of downloads, including recent television broadcasts of popular CBS shows and professional basketball games, as well as vintage episodes from series that went off the air decades ago

From : Google Video Team <video-support@google.com>

Hello, We recently emailed you to let you know that Google is ending the Google Video download to own/rent (DTO/DTR) program...

We've received feedback from people dissatisfied with our approach...

1. We will fully refund your credit card for the total amount of your Google Video purchases.
2. We're going to continue to support playing your videos through February, 2008. We won't be offering the ability to buy additional videos, but what you have already downloaded will remain playable.
3. The Google Checkout bonus you've already received is yours to keep. Your bonus expires on October 31, 2007...

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Issues and Non-issues in the press

- ◆ **Storage in crisis**
 - Will CD's be readable in 50 years?
 - Will VHS tapes be readable in 20? Will anyone care?
- ◆ **Backup Media**
 - 2 TB Disk \$231, available now. (1.5TB \$129)
 - DVD is 4.3 GB, dual layer 8 GB, Blu-ray 50 GB
 - Current backup tapes 100-800 GB
 - 1 in 10 recover attempts fail (?) - Gartner Group
- ◆ **Solid state storage**
 - No moving parts, lower energy consumption, better random read performance.
 - 128GB is \$307 in 2009 (256GB is \$609)

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Aren't Operating Systems Dead?

- ◆ The operating system (OS) I use has already been written, and I doubt it will be my job to write another one.
 - For example, Windows, Linux.
 - ... So, why should I study operating systems?
- ◆ Haven't OS developers figured everything out already? What more is there to do?
- ◆ Why should I study this as an undergraduate?

- ◆ Studying OS design IS studying design of large software systems.
- ◆ OS is needed to make hardware useful.
- ◆ Please think of one question you have about computing

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Why Study Operating Systems?

- ◆ Because OS hacking will make you a better programmer and a better thinker.
 - The OS is really large (Windows Vista is 50 million lines+).
 - The OS manages concurrency.
 - Concurrency leads to interesting programming challenges.
 - (Interesting programming challenges can lead to wisdom.)
 - OS code manages raw hardware.
 - Programming raw hardware is challenging: timing dependent behavior, undocumented behavior, HW bugs.
 - OS code must be efficient, low CPU, memory, disk use.
 - OS fails ⇒ machine fails. OS must fail less than user programs.
 - OS provides services that enable application programs
 - ... knowledge of OS will make you a better computer user
 - OS basis of system security.

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Why Won't Operating Systems Go Away?

- ◆ Hardware needs an OS to be useful.
 - Multiplex resources for efficiency and security.
- ◆ OS is cornerstone of what makes computing fun.
- ◆ The design of an MP3 player involves many OS issues:
 - Its OS implements a file system which is specially designed to store music files.
 - The OS manages communication with your PC.
 - The OS reads music from the disc and buffers it in memory.
 - The OS controls the volume of the output device.
 - The OS controls the display.
 - The OS controls wireless network access.
- ◆ Cell phone, mp3 player, DVD player, TIVO, PDA, iPhone, eBook reader, peer-to-peer file sharing
- ◆ Systems/Theory/Artificial intelligence

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- ◆ Capstone course
 - Combines skills from many different courses
 - Programming languages
 - Data structures
 - Algorithms
- ◆ Projects
 - Build components of an operating system
 - Thread/process manager, memory management, file system, ...
 - Enhance software engineering skills
 - Thread programming, build large systems, group projects
 - Practical computer science is heavy on learn by doing
- ◆ The engineering in computer science

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Design and Implementation

- ◆ Design problems.
 - Understand the problem, and define it.
 - Understand the space of possible solutions, previous approaches
 - Formulate your own approach and justify why it might work.

- ◆ Implementation issues.
 - Real systems are more difficult to build than to explain.
 - The devil is often in the details.
 - Building a system gives you satisfaction, and feeling of accomplishment.

- ◆ Mix of specific and general
 - One way to do memory management (but a very interesting way).
 - Many scheduling algorithms.
 - Light on details of specific OSes, look at larger issues that change infrequently

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Administrivia *iClicker*

- ◆ We will use the iClicker system.
- ◆ Almost exclusively for in-class use to make sure y'all are following the material
 - It beats relying on the 5 students who like to talk
 - It avoids pressuring individuals

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Administrivia

Collaboration and Cheating

- ◆ Working in groups on homeworks is OK but...
 - You can only collaborate with other students in the course
 - Every student must craft their own final solution
 - Every student must fully write up their solution
 - All collaborators must be acknowledged in writing
- ◆ Collaboration
 - Discuss problem sets and programming assignments
 - Discuss possible interpretation of questions, technical details
- ◆ Cheating
 - Copying solutions code or programs from someone else, previous year's solutions, or public domain
 - Providing material for someone else to imitate IS still cheating.
 - Participate in discussion group where one person writes solution and everyone else copies it
- ◆ Grading
 - 5 lab slip days
 - Pair programming
 - Your visa status/parents coming to graduation/etc.

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Administrivia

Attendance & Classroom Etiquette

- ◆ Attendance is expected
 - Important things will be announced in class
 - Slide questions will be answered in class
 - I take attendance with iclicker
 - If you will miss many classes, you can email me with your reasons
- ◆ No laptops in class
 - I don't mind your watching youtube, but it distracts others
- ◆ Lecture notes
 - Lecture notes are provided for your convenience
 - Exam review notes are provided for your convenience
 - What is said in class takes precedence
- ◆ You must read the book or external sources
 - Class/notes is for high-level concepts
 - Lab & reading is for low-level details
 - Labs and exams rely on low-level details
 - Book is optional, but reading is NOT

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Administrivia

Where to go for help?

- ◆ Attend class.
 - Unannounced in-class quizzes to encourage attendance.
- ◆ Ask questions in class.
 - Exercise your understanding of the course material on a daily basis
- ◆ Attend office hours
 - Emmett's office hours are W 14:30-15:30 in ACES 6.240
 - Naga's office hrs: TBA Location TBA
 - If you can't come to office hours, set up an appointment
- ◆ Please limit e-mail to personal issues.
- ◆ Use the blackboard discussion board

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Course Overview

- ◆ OS Structure, Processes and Process Management
- ◆ CPU scheduling
- ◆ Threads and concurrent programming
 - Thread coordination, mutual exclusion, monitors
 - Deadlock
- ◆ Virtual memory & Memory management
- ◆ Disks & file systems
 - Distributed file systems
- ◆ Security
- ◆ Review of the movie, Primer.

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Course Information and Handouts

- ◆ Slides are available online.
- ◆ A course packet is available.
- ◆ Updates will be made during the semester.

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