CSCI 4730 / 6730: Operating Systems

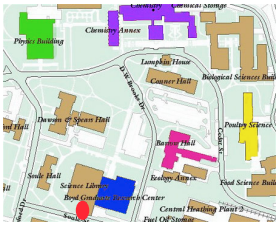
Course Overview

Short Term Plan

- *Today go over expectations and course plan*
- Tuesday discuss presentation topics & some advice on giving talks

Administration / Logistics

- Who am I?
  - Office: Boyd 219C
- Class:
  - Boyd 306 (blue)
  - Boyd 208 (blue
  - maria@cs.uga.edu
- Office Hours: Thu 3:30-4:30
  - And by e-mail appointment
- TA: TBD - check class web page for updates…



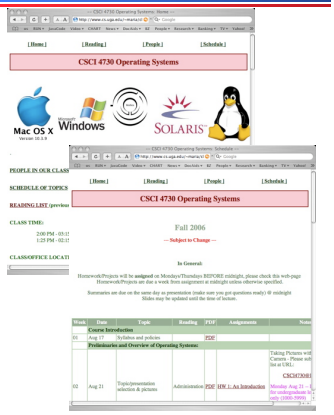
Communication

Web Page:

- http://www.cs.uga.edu/~maria/classes/4730-Fall-2011/schedule.html
  - Check often (everyday)
- Your Responsibility
  - Understand policies, honor code
  - Work independently on projects/ hw
  - Check page often for updates
  - HW, Projects, Deadlines

Email list:

- Will set up (see web page for update) -→ listserv.uga.edu



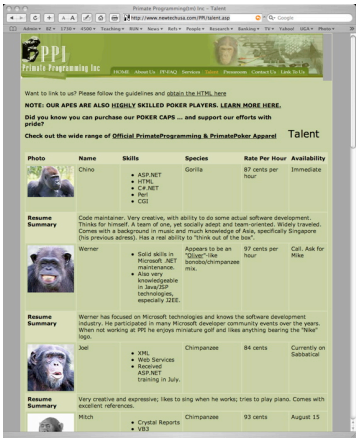
Course Objective

- Exposure to *real* kernel hacking.
  - Experience that carries to most other OS.
- Build appreciation for 'working' Operating Systems – commercial and 'free'
  - Continue help develop OSs over the net – join groups, hack kernel features and extensions.
- Improve your background when choosing a kernel to hack and work with.
- Introduction to research on operating systems: past and present.

Areas that we will investigate

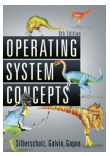
- Know and understand fundamental issues of operating systems
  - Processes (lecture, project, homework)
    - Communication: Socket programming & other IPC
  - Threads (lecture, homework)
  - Scheduling (lecture, project, homework)
  - Synchronization & Deadlock
  - Memory Managements & Virtual Memory
  - File Systems
  - I/O System (presentations)
  - Mass Storage (presentations)
  - More…. Tune your programming skills and understanding -- resume building - simulation practice gives you -- versatility, Internet games, entertainment
    - Why learn programming when you can get a gorilla do it for you? [BONUS ?]

Beat the Competition



How we're going to do it

- **Read & Listen**
  - » "Operating Systems Concepts." 8th "Update" Edition, Silberschatz, Galvin, Gagne (or later edition) *Required
  - » "Operating Systems, MINIX", Tanenbaum) *** On reserve, recommended.
- **Practice**
  - » 5-7 programming assignments
    - – At least 5, more likely 6.
  - » Mini-Conference Technical paper presentations & summary.
    - – Learn how to read/skim papers
    - – present & listen to your peers
      - Learn how to make a nice presentation - friendly environment
- **Test**
  - » 2 Midterms, 1 Final, Quizzes (frequent)



How to get an A? B? C?... F?

- **Theory 40%**
  - » 2 Exams (10% each) + Final 15% + Quizzes 05% = 40%
- **Practice 5555555% (or 55%)**
  - » 9-11 homework (10%) & summaries (15%) & presentation (10%) & programming assignments (20%) & session chairing (HW)
- **Participation 5%**
  - » 100% attendance will raise your final grade by 2%
- **Grading (below 60 F)**
  - » 90-92 A-
  - » 87-89 B+
  - » 83-86 B
  - » 80-82 B-
  - » 77-79 C+
  - » 73-76 C
  - » 70-72 C-

Grading (below 60 F)
67-69 D+
63-66 D
60-62 D-

Expected Effort: 3-4 hours per "credit hour" per week translates to 12-16 hours per week

Policy on Collaboration

- **Assignments/projects/summaries:**
  - » Purpose: familiarization of concepts and details of operating systems
  - » Work on project independently:
    - – No Direct Sharing of code
    - – No line-by-line assistant
    - – No exchange of code
  - » You are encouraged to ask questions of one another, and to respond to other student's questions (and especially on the email list)
- **Exams:**
  - » Closed-book. No outside assistance is permitted. No additional materials may be used.
  - » No make-up tests unless absence is due to serious illness. Doctor's diagnostic note is required. The final grade will be scaled accordingly.

Paper Presentations

- **1-2 presentations will be expected (2nd presentation may be a 'teams' of 2 presentations)**
- **We discuss topics**
  - » Caveat: If someone sign up for a paper and then later drops, we may need to shift the last scheduled person to the empty slot(s) (other volunteers are welcomed and will be solicited in class).
- **Format:**
  - » Mini-conference / talkfest
  - » 3 Presentations – 10 minutes long (about 10-15 slides)
    - – Core topics, research projects (e.g., clouds) or project (MINIX) oriented topics

Paper Summaries

- **One page summary of an assigned technical paper -- need to reflect that you understand the paper and its contribution(s) to the area:**
  - » What is the problem that the authors are trying to solve? [why is it important]
  - » What is their approach and how is it original and innovative? [compare against contemporary approaches]
  - » How is the approach evaluated?
    - – What are the assumptions/limitations?
    - – Strength & weaknesses
  - » What are the results/impact of paper (Why is this paper important, relevant)?
  - » What constructive criticism can you give to the presenter (e.g., would should have been included/excluded)? *Do not discuss presentation style of speaking, comment on 'content' of talk and possibly organization.*
- See for latest bullets point on reading list web page

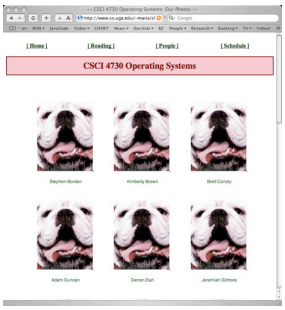
Tentative projects for class

Tentative projects (these may change)

1. Simple shell/interpreter
2. A Gentle MINIX Kernel Hack
3. Process communication (Sockets)
4. Modify the MINIX Scheduler (Challenging)
5. Synchronization/Threads : Implement Semaphores in MINIX or Implement conditional variables.
6. Virtual Memory allocation policies in MINIX
7. File Server for MINIX (if time permits)

Homework 1

- See schedule for details…
- Digital Image -- How to get out of the dog pound (and improve your grade).



Schedule of Topics

See Handout - Subject to Change

Please check web page often

Subscribe to email list (when set-up)

Contributors

- Tidbits & Material are drawn from several resources:
  - Book Authors:
    - Avi Silberschatz, Peter Baer Galvin and Greg Gagne
    - Andrew S. Tanenbaum, Vrije Universiteit
    - William Stallings
    - Deitel & Deitel's OS Book
    - Many More…
  - Other Instructors & Colleagues:
    - Andrea & Remzi Arpaci-Dusseau, University of Wisconsin
    - Andy Wang, (UCLA) now Florida State University
    - Fred Kuhns, Washington University
    - Jeff Donahoo, Baylor University (TCP/IP and sockets)
    - List is growing see syllabus for more
  - Students Feedback
  - Wikipedia (Yes! It is becoming quite nice)

Quiz & Introductions

Please turn in on note book paper: Please tell us:

- Name, major, year?
- What computer hardware do you own (include smart phones if you own one)?
- List the Operating Systems that are familiar to you?
- Write a C program that computes the mean, mode (most frequent) and median (if even then take the average of the 'middle' two) of integers entered from standard input, one number per line, and let the number 0 indicate end of input). Assume the range of integers are between [0,1000] inclusive.
  - `#include <stdio.h>`
  - `int inputnumber = 0;`
  - `scanf("%d",&inputnumber);`