CIS 415 – Operating Systems - Introduction

Joe Sventek
Announcements

- The Accessible Education Center is requesting a peer notetaker for this course (CRN: 31563). You can earn $25 per credit hour for uploading the notes that you’re already taking. If you take clear and comprehensive notes, please go to http://aec.uoregon.edu to sign up to be a notetaker. You may also enter the CRNs of other classes you are taking to see if there are additional notetaking opportunities.

- Roscoe Casita, the GTF for the course, is conducting a Doodle poll to determine the best times to hold his office hours in 100 Deschutes. If you have not already completed the poll, please go to http://doodle.com/poll/gnxff3ueafswasem and complete it before 12:00, noon, on 5 April 2017.
Course Outline

- Logistics
- What is CIS 415?
- What is expected of you?
- What will you learn in CIS 415?
Course Logistics

- **Lecture time**
  - CRN 31563: Tue/Thu @ 14:00-15:20, McKenzie 125

- **Midterm**
  - Thursday, 4 May, 14:00-15:20, McKenzie 125

- **Final**
  - Tuesday, 13 June, 12:30-14:30, McKenzie 125

- **Undergraduate course prerequisites**
  - CIS 314, CIS 330

- **Discussion/Lab**
  - CRN 31564: Thursday, 11:00-11:50, 26 Klamath Hall
  - CRN 31565: Friday, 14:00-14:50, 26 Klamath Hall
  - CRN 31566: Friday, 16:00-16:50, 26 Klamath Hall
Personnel

- **Instructor**
  - Joe Sventek (jsventek@uoregon.edu)
    - Internet of Things
    - Complex Event Processing
  - Office hours, 358 Deschutes Hall
    - Mon 4:00-5:30, Tue 9:00-10:30
    - And by appointment

- **Teaching assistant**
  - Roscoe Casita (rcasita@uoregon.edu)
  - Office hours, 100 Deschutes
    - Mon 10:00-11:00, Tue 4:00-5:00, Thu 9:30-10:30, Fri 12:30-1:30, Fri 3:00-4:00
Resources

- CIS 415 web page: https://www.cs.uoregon.edu/classes/17S/cis415/
- Discussion board on Piazza: https://piazza.com/class/izynvurpwel5a9
- We use Canvas for turning in projects, and accessing files not already on the web site.
Course Structure

- **Lectures (Prof Sventek)**
  - Focus on core concepts
  - Quizzes and exams

- **Lab sessions (Roscoe Casita)**
  - Present material needed for programming assignments – C and Unix, threads, signals, etc
  - Provide programming assignment assistance
  - Tutorials and practice sessions

- **Grading**
  - 5% lab attendance
  - 20% assignments, quizzes
  - 15% midterm (4 May, in class)
  - 30% final exam (13 June, 12:30-14:30, McKenzie 125)
  - 30% programming projects (3 individual projects)
Course Plan

- **Topics covered (18 lectures)**
  - Heap review & ADTs, OS Overview
  - OS structures and system calls, Processes
  - IPC, Threads and Thread-safe ADTs
  - CPU scheduling, Real-time systems
  - Synchronization, Deadlocks
  - Main memory, Virtual memory, Cache memory
  - Virtual machines, File system interface
  - File system implementation, IO and mass-storage systems
  - Protection

- **The Schedule lists all relevant readings, assignments, test dates**
  - Links to online papers assigned for course readings
  - Supplements to OSC book

- **Check course web page for announcements and updates**
Lectures

- OSC book and online materials are your main sources for broader/deeper OS information
- Most lectures will stick close to the OSC book content
  - Cover fundamental topics of more importance
  - Cannot cover everything in a single quarter
  - Other materials are provided for lectures 1, 8 and 13
- Lectures will complement programming component with respect to overall ideas, but the online materials will be more useful for implementation
What is expected of you?

- **Background**
  - CIS 314 – computer organization and architecture
  - CIS 330 – C/C++ and Unix programming

- **I expect you to maturely engage with the course**
  - Attend lectures (I discuss material that is not in the book or the notes)
  - Attend labs (use of tools that you must master to successfully tackle the projects)
  - Submit homework assignments and projects on time – *N.B. no late submissions will be accepted!*
  - Take advantage of office hours to help you understand the material.
  - Read handout material before turning to Piazza

- **Effectively use source material, online documentation, books, and the Internet to look things up**

- **Persistence – stay on top of the work**
What will you get out of CIS 415?

- **My goals**
  - Provide you with an understanding of the fundamentals of modern operating systems
  - Provide you with in-depth practical experience in working with the Linux OS and system programming tools

- **Your goals**
  - Commit to a challenging course
  - Maintain sustained effort throughout the quarter – failure to do so will reduce learning

- **Pay-off**
  - OS knowledge is fundamental
  - Systems programming skills are highly marketable

- **As with all courses, you will get out of it what you put into it!**
Course Projects

- Best way to understand the material is by doing
- Focused on programming in a Linux environment and understanding systems issues
- All are individual projects
- Learning targets:
  - Project 0 – sophisticated C programming of ADTs
  - Project 1 – build a process scheduler using the process control system calls in Linux
  - Project 2 – build a concurrent device driver using Pthread mechanisms
Environment for Projects

- You have been provided with 64-bit and 32-bit Arch Linux images for use with Oracle’s VirtualBox
- I do not prescribe which environment you use for developing and testing your code.
- Your submission will be graded on a 64-bit Arch Linux system running in VirtualBox
- Therefore, it is imperative that you test your code in the Arch Linux environment before you submit; things that work perfectly well in your development/testing environment may work differently in the VM.
- If you do not/cannot install and run VirtualBox on your personal system, VB is installed on all systems in 100 Deschutes for your use.
Course Schedule

- The CIS 415 web site has a “Logistics” link which takes you to a page with the course schedule.
- It shows lecture topics and provides links to slides.
- It shows the readings that you should complete before each lecture, with links to online documents beyond the book.
- It shows assignments and due dates.
- There may be changes to the schedule.
  - Students are responsible for checking the schedule for changes.
Acknowledgements

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• The following contributions are particularly acknowledged:
  ◦ Prof Kevin Butler’s course in Spring 2014 provided excellent lecture material and structure for programming projects.
  ◦ Prof A Malony’s course from Fall 2014 also provided excellent material.
  ◦ The OSC book comes with instructor materials, including chapter-by-chapter lecture slides.
  ◦ “What every Programmer Should Know About Memory” by Ulrich Drepper of Red Hat Inc., from which the Cache handout was derived.