15-213
"The Class That Gives CMU Its Zip!"

Introduction to Computer Systems

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Topics:

- **Staff, text, and policies**
- **Lecture topics and assignments**
- **Lab rationale and infrastructure**

Teaching staff

- **Instructors**
  - **Prof. Randal E. Bryant**
  - **Prof. Dave Eckhardt**

  - **TA's**
    - **Nate Bauernfiend**
    - **Tessa Eng**
    - **Pratyusa Manadhata**
    - **Austin McKinley**
    - **Allison Naaktgeboren**
    - **Brett Simmers**
    - **Lawrence Tan**
    - **Owen Yamauchi**

  - **Course Admin**
    - **Cindy Chemsak (NSH 4303)**

Come talk to us anytime!
(Or phone or send email)

Textbooks

Randal E. Bryant and David R. O'Hallaron,

- "Computer Systems: A Programmer's Perspective", Prentice Hall 2003.
- http://csapp.cs.cmu.edu

Brian Kernighan and Dennis Ritchie,

- "The C Programming Language, Second Edition", Prentice Hall, 1988

Course Components

Lectures

- Higher level concepts

Recitations

- Applied concepts, important tools and skills for labs, clarification of lectures, exam coverage

Labs

- The heart of the course
- 1 or 2 weeks
- Provide in-depth understanding of an aspect of systems
- Programming and measurement

Getting Help

Class Web Page

- http://www.cs.cmu.edu/~213
- Copies of lectures, assignments, exams, solutions
- Clarifications to assignments

Message Board

- http://autolab.cs.cmu.edu
- Clarifications to assignments, general discussion
- The only board your instructors will be monitoring (No blackboard or Andrew)

Getting Help

Staff mailing list

- 15-213-staff@cs.cmu.etc
- "The autolab server is down!"
- "Who should I talk to about ..."
- "This code {...}, which I don't want to post to the bboard, causes my computer to melt into slag."

Teaching assistants

- I don't get "associativity"...
- Office hours, e-mail, by appointment
  - Please send mail to 15-213-staff, *not a randomly-selected TA*

Professors

- R. Bryant, office hour or appt.
- D. Eckhardt, office hour, appt, or when door is open.
- "Should I drop the class?" "A TA said ... but ..."

Policies: Assignments

Work groups

- You must work alone on all labs

Handins

- Assignments due at 11:59pm on Wed or Fri evening
- Electronic handins using Autolab (no exceptions!).

Conflict exams, other irreducible conflicts

- OK, but must make PRIOR arrangements with Prof. Eckhardt.

Appealing grades

- Within 7 days of due date or exam date.
- Labs: Talk to the lead person on the assignment
- Exams: Talk to Prof. Eckhardt.

Cheating

What is cheating?

- Sharing code: either by copying, retyping, looking at, or supplying a copy of a file.
- Coaching: helping your friend to write a lab, line by line.

What is NOT cheating?

- Explaining how to use systems or tools.
- Helping others with high-level design issues.
- Listening to problem descriptions and suggesting tools or approaches.

Penalty for cheating:

- Removal from course with failing grade.

Detection of cheating:

- We do check and our tools for doing this are much better than you think!

Policies: Grading

Exams (40%)

- Two in class exams (10% each)
- Final (20%)
- All exams are open book / open notes.

Labs (60%)

- 7 labs (6-12% each)

Grading Characteristics

- Lab scores tend to be high
  - Serious handicap if you don't hand a lab in
  - We offer generous redemption programs
- Tests typically have a wider range of scores

Facilities

Labs will use the Intel Computer Systems Cluster (aka "the fish machines")

- 15 Pentium Xeon servers donated by Intel for CS 213
- Dual 3.2 Ghz 64-bit (EM64T) Nocona Xeon processors
- 2 GB, 400 MHz DDR2 SDRAM memory
- Rack mounted in the 3rd floor Wean Hall machine room.
- Your accounts are ~~ready~~ nearing readiness.

Getting help with the cluster machines:

- See course Web page for login directions
- Please direct questions to your TA's first

Logging into Fish Machines

Logging in will work soon, but does not work now

Read description on the course web-page carefully

Run checkin script (once only) to setup Kerberos credentials

> % **/afs/cs/academic/class/15213-s08/bin/checkin**

Login using your Andrew ID and password:

> % ssh –x –l bovik@ANDREW.CMU.EDU tuna.ics.cs.cmu.edu

Keep your code in your "213hw" directory on your *Andrew* account

Programs and Data (6)

Topics

- **Bits operations, arithmetic, assembly language programs, representation of C control and data structures**
- **Includes aspects of architecture and compilers**

Assignments

- **L1 (datalab): Manipulating bits**
- **L2 (bomblab): Defusing a binary bomb**
- **L3 (buflab): Hacking a buffer bomb**

Performance (2)

Topics

- **High level processor models, code optimization (control and data), measuring time on a computer**
- **Includes aspects of architecture, compilers, and OS**

Assignments

- **L4 (perflab): Optimizing code performance**

The Memory Hierarchy (2)

Topics

- **Memory technology, memory hierarchy, caches, disks, locality**

- **Includes aspects of architecture and OS.**

Assignments

- **L4 (perflab): Optimizing code performance**

Linking and Exceptional Control Flow (3)

Topics

- Object files, static and dynamic linking, libraries, loading
- Hardware exceptions, processes, process control, Unix signals, nonlocal jumps
- Includes aspects of compilers, OS, and architecture

Assignments

- L5 (tshlab): Writing your own shell with job control

Virtual Memory (4)

Topics

- **Virtual memory, address translation, dynamic storage allocation**
- **Includes aspects of architecture and OS**

Assignments

- **L6 (malloclab): Writing your own malloc package**

I/O, Networking, and Concurrency (6)

Topics

- **High level and low-level I/O, network programming, Internet services, Web servers**

- **concurrency, concurrent server design, threads, I/O multiplexing with select.**

- **Includes aspects of networking, OS, and architecture.**

Assignments

- **L7 (proxylab): Writing your own Web proxy**

Lab Rationale

Each lab should have a well-defined goal such as solving a puzzle or winning a contest.

Doing a lab should result in new skills and concepts

We try to use competition in a fun and healthy way.

- Set a reasonable threshold for full credit.
- Post intermediate results (anonymized) on Web page for glory!

Autolab Web Service

Labs are provided by the Autolab system

- Autograding handin system developed in 2003 by Dave O'Hallaron
- Apache Web server + Perl CGI programs
- Beta tested Fall 2003, very stable by now

With Autolab you can use your Web browser to:

- Review lab notes, clarifications
- Download the lab materials
- Stream autoresults to a *class status Web page* as you work.
- Handin your code for autograding by the Autolab server.
- View the complete history of your code handins, autoresult submissions, autograding reports, and instructor evaluations.
- View the class status page

Good Luck!