15-213
“The Class That Gives CMU Its Zip!”

Introduction to Computer Systems

Dave Eckhardt
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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,
- http://csapp.cs.cmu.edu

Brian Kernighan and Dennis Ritchie,
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.edu
- “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 autoreturns 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, autoreturn submissions, autograding reports, and instructor evaluations.
  - View the class status page
Good Luck!