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

Introduction to
Computer Systems

Dave Eckhardt
January 15, 2008

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

1   `class01b.ppt`

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)

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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**

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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**

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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

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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

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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

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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

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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

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The Memory Hierarchy (2)

Topics
- Memory technology, memory hierarchy, caches, disks, locality
- Includes aspects of architecture and OS.

Assignments
- L4 (perflab): Optimizing code performance

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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

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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

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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!