CS 213
Introduction to Computer Systems

Course Organization

Dave O’Hallaron
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Topics:
• Staff, text, and policies
• Lecture topics and assignments
• Lab rationale
Teaching staff

Instructors
– Prof. Randal E. Bryant (Tue 10:30-11:30, WeH 7128)
– Prof. David R. O’Hallaron (Tue 10:30-11:30, WeH 8125)

TA’s
– Khalil Amiri (Wed 4-5, WeH 8114)
– Jeff Pierce (Wed 3-4, WeH 4114)
– Sanjay Rao (Mon 2-3, WeH 8208)
– Seggy Umboh (Wed 5-6, Wean Cluster)

Course secretary
– Joan Maddamma (WeH 7121)

These are the nominal office hours. Come talk to us anytime!
(Or send email)
Textbook

Samuel P. Harbison and Guy L. Steele,

• *C: A Reference Manual*,
• *Fourth Edition*
• Prentice Hall, 1994

Unfortunately, there is no real “textbook” for this material.

• H&S is a C reference book, since we will be programming in C.
  – Note: simply knowing C++ is not sufficient, since C is different.
• It provides only partial coverage of the course material.

Remainder will be provided in notes and handouts.
We’re writing the alpha version of the text this term.
Course Components

Lectures
• Higher level concepts

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

Labs
• Multi-week (usually 2 weeks)
• groups of up to 2 people
• Provide in-depth understanding of an aspect of systems
• Programming and measurement

Homeworks
• 1 week (individual)
• Solving a series of smaller problems, some programming
• drills to provide practice for exams
Getting Help

Web
- www.cs.cmu.edu/afs/cs/academic/class/15213-f99/www
- Copies of lectures, assignments, exams, solutions
- Clarifications to assignments
- Summaries of performance on exams and assignments

Newsgroup
- cmu.cs.class.cs213
- Clarifications to assignments, general discussion

Personal help
- Professors: door open means come on in (no appt necessary)
- TAs: please mail or zephyr first.
Policies: Assignments

Work groups
- You may do all labs in groups of up to 2.
- Homeworks you do by yourself.

Handins
- Labs due on Wed, Homeworks on Tues.
- Assignments due at 11:59pm on specified due date.
- Electronic handins only.

Makeup exams and assignments
- OK, but must make PRIOR arrangements with Prof. O’Hallaron.

Appealing grades
- Within 7 days of due date.
- Assignments: Talk to lead TA first, then one of the professors.
- Exams: Talk to Prof. O’Hallaron.
Policies: Grading

Exams (50%)
- Two in class exams (12.5% each)
- Final (25%)
- All exams are open book/open notes.

Assignments (50%)
- 5 homeworks (~1 week, 2% each)
- 5 labs (~2 weeks, 8-12% each)

Grading Characteristics
- Assignment scores tend to be high
  - Serious handicap if you don’t hand a lab in
- Tests have big bearing on letter grade
  - Wider range of scores
  - Only chance for us to evaluate individual performance
Facilities

Assignments will use Intel Computer Systems Cluster

- 25 Pentium III machines donated by Intel specifically for CS 213
- 550 MHz with 256 MB memory.
- Rack mounted in the 3rd floor Wean machine room.
Part 1: Programs (12)

Topics

• Bits operations, arithmetic, assembly language programs, representation of C control and data structures, object files, processes, asynchronous processing, system programming
• Includes aspects of architecture, OS, and compilers

Assignments

• L1: Integer arithmetic
• H1: Human decompiler
• L2: Defusing a binary bomb

• H2: floating point
• H3: system programming
Part 2: Memory (8)

Topics

- Memory management, memory technology, memory hierarchy, address translation
- Includes aspects of architecture and OS.

Assignments

- L3: Dynamic memory allocation
- H4: Address translation
Part 3: Performance (2)

Topics
• Code optimization (control and data), performance evaluation, benchmarking
• Includes aspects of architecture and compilers

Assignments
• L4: Optimizing cache performance
Part 4: Networking (5)

Topics
- Network technology, protocol stacks, TCP/IP, routing, sockets, internetworking, and Web programming
- Includes aspects of networking and architecture

Assignments
- L5: Devising and/or reverse engineering a network protocol (e.g., “feeding a hungry cookie monster”)
- H5: network simulation
Lab Rationale

Each lab should have a well-defined goal such as solving a puzzle or winning a contest.
  • Defusing a binary bomb.
  • Winning a performance contest.
  • Feeding a cookie monster.

Doing a lab should result in new skills and concepts
  • Bit Manipulation: computer arithmetic, digital logic.
  • Bomb: assembly language, using a debugger.
  • Malloc: understanding pointers and nasty memory bugs.
  • Cache: profiling, measurement, performance debugging.
  • Cookie: packet monitors, network simulators, client/server computing.

Reverse engineering is a recurring theme
  • And a key job skill!!!