CS 213
Introduction to Computer Systems

Course Organization

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Topics:

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

Teaching staff

Instructors

- Prof. Randy Bryant (Wed 10:00-11:00, WeH 4220)
- Prof. David O'Hallaron (Tue 10:30-11:30, WeH 8125)

TA's

- Jason Crawford (TBD, Wean Cluster)
- Blake Scholl (Wed 3:00-4:00, Wean Cluster)
- Bianca Schroeder (Tue 1:30-2:30, WeH 5123)
- Tiankai Tu (TBD, WeH 5119)

Course Admin

- Rosemary Battenfelder (WeH 4218)

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

Textbooks

Brian Kernighan and Dennis Ritchie,

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

Randy Bryant and David O'Hallaron,

- ***Introduction to Computer Systems: A Programmer's Perspective***
- **To be published by Prentice Hall**
- **alpha version of the text in the form of handouts**
- **Your feedback on the notes is very important.**

Course Components

Lectures

- **higher level concepts**

Recitations

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

Homeworks

- **1 week (individual)**
- **solving a series of smaller problems, some programming**
- **drills to provide practice for exams.**

Labs

- **multi-week (usually 2 weeks)**
- **groups of up to 2 people**
- **provide in-depth understanding of an aspect of systems**
- **programming and measurement**

Some unavoidable overlap of labs and homeworks early in the course.

Getting Help

Web

- www.cs.cmu.edu/afs/cs/academic/class/15213-f00/www
- Copies of lectures, book chapter handouts, 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 individually

Handins

- Assignments due at 11:59pm on specified due date.
- Either 11:59pm Monday evening or 11:59pm Wednesday evening.
- Electronic handins only.

Makeup exams and assignments

- OK, but must make PRIOR arrangements with either Prof. Bryant or O'Hallaron.

Appealing grades

- Within 7 days of due date or exam date.
- Assignments: Talk to the lead person on the assignment
- Exams: Talk to either Prof. Bryant or O'Hallaron.

Policies: Grading

Exams (50%)

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

Assignments (50%)

- 4 homeworks (~1 week, 2% each)
- 5 labs (~2 weeks, 8-10% 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 (aka "the fish machines")

- 25 Pentium III Xeon servers donated by Intel for CS 213
- 550 MHz with 256 MB memory.
- Rack mounted in the 3rd floor Wean machine room.
- We'll be setting up your accounts this week.

Getting help with the cluster machines:

- See "Information about the Intel Cluster" on the 213 homepage.
- Please direct questions to the CS Help Desk (identify yourself as a CS 213 student),
  - help@cs.cmu.edu
  - x8-4231 (24x7)
  - WeH 3613 9-5pm

Part 1: Programs and data (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 of architecture, OS, and compilers

Assignments

- L1: Bit manipulation
- L2: Defusing a binary bomb

- H1: Human decompiler
- H2: Floating point
- H4: Concurrency (processes, threads, and signals)

Part 2: Memory (8)

Topics

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

Assignments

- L4: Dynamic memory allocation/garbage collection

- H3: Address translation

Part 3: Performance (2)

Topics

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

Assignments

- L3: Optimizing cache performance

Part 4: I/O and Networking (5)

Topics

- Networking as the most interesting form of I/O.
- Network technology, protocol stacks, TCP/IP, routing, sockets, internetworking, network programming, and Web programming.
- Includes aspects of networking and architecture.

Assignments

- L5: building a chat server

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.
- Being able to chat with your classmates

Doing a lab should result in new skills and concepts

- Bit Manipulation: computer arithmetic, digital logic.
- Bomb: assembly language, using a debugger.
- Malloc/GC: understanding pointers and nasty memory bugs.
- Cache: profiling, measurement, performance debugging.
- Chat: network programming & performance, client/server computing.

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

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