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