15-122: Principles of Imperative Computation

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http://cs.cmu.edu/~15122
http://c0.typesafety.net/
Overview

• Goals of this course

• Interactions
  – Lectures, labs, recitations, office hours

• Assessment
  – Quizzes, homework (written, prog.), exams

• The course begins ...
<table>
<thead>
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<th>Activity</th>
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<td>R E P L Y</td>
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<td>D E F I N E</td>
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- Copy these words on a sheet of paper
- Complete the blanks to create new words (in any language)
- Turn the sheet of paper over and leave it that way
Programming Skills

• Transforming algorithmic ideas to code
  – Code that works the first time around
    • Deliberate programming
  – Well, nearly the first time around
    • Writing tests

• Imperative programming in C and C0

• Basic Unix survival
Algorithmic Ideas

• Asymptotic complexity
  – time/space
  – worst case/average case/amortized analysis
  – important classes: $O(1)$, $O(\log n)$, $O(n \log n)$, $O(n^k)$, $O(2^n)$

• Important ideas like order and randomness

• Lots of fundamental data structures

(Psst... this is often what tech interviews test on!)
Computational Thinking

• “Thinking like a computer scientist” is important for lots of people, not just computer scientists!
  – Systematic approach to solving a problem
  – Finding solutions that are correct
  – Finding solutions that are efficient

• Develop vocabulary and tool kit
The Big Picture

• Pre- or co-requisites
  – either 15-151 (Math Foundations for CS)
  – or 21-127 (Concepts of Mathematics)

• Counterpart
  – 15-150 (Principles of Functional Programming)

• Pre-requisite for
  – 15-213 (Introduction to Computer Systems)
  – 15-210 (Parallel and Sequential Data Structures and Algorithms)
  – 15-214 (Principles of Software System Construction)
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Online Resources

• Course home page
  – [http://cs.cmu.edu/~15122](http://cs.cmu.edu/~15122)
  – Schedule, lecture notes, calendar, contact info...
  – Office hours start soon

• C0 home page
  – [http://c0.typesafety.net/](http://c0.typesafety.net/)
  – Tutorial, reference, examples, binaries
Lectures

• Tuesday and Thursday
• Please be here, please be active
  – Ask and answer questions, pay attention
  – Lecture notes for review
  – **NEW!** *a few online modules* (optional)
• Laptops for note-taking only
  – No surfing, email, games, ...
  – Work on your homework elsewhere
  – If you can see board from the back row, be there
  – **Too distracting for other students**
Labs and Recitations

• Labs Monday (programming exercises)
• Recitations Friday (review & written exercises)

• **Collaborative** problem solving
  – Help others if you are done early!
• How-to programming and tool support
• *Attend the lab/recitation you’re registered for*
Getting-started Help

• Laptop setup office hours
  – Wednesday 4:30 to 6:30pm, Porter Hall 100
  – Set up using the C0 tools with Andrew Linux
  – Format: drop in for half an hour
    (or do it yourself: http://c0.typesafety.net/tutorial/C0-at-CMU.html)

• Linux workshops
  – Thursday and Tuesday 7 to 9pm, Doherty Hall 2315
  – Learn useful Linux commands
Online communication

- **Autolab** and **Gradescope** for homework
- Grades from web page
- **Piazza** for announcements, questions, and communication with course staff
  - Get help, help each other!
- Cluster Linux machines and SSH to shared machines for assignments
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Assessment

• 50% - Exams (2 midterms and a final)

• 45% - Weekly Homework
  – *Written* due Monday by 9pm through Gradescope
    • No late days: 50% penalty if handed in within 12 hours
    • ∞ submissions
  – *Programming* due Thursday 9pm through Autolab
    • Download assignments and code from Autolab
    • 3 late days, at most 1 per homework
    • No extensions

• 5% - Quizzes and lab/recitation participation
  – Quizzes in lecture and recitation
  – Basically: attend, make a good effort, get full credit
Grades

Grade Forecaster

david49's Past Performance and Future Projections

Grade projection as of Hw7
Click and drag in the plot area to zoom in

Already graded
Not yet graded

... what if ...

Hw8: NA %  Hw9: NA %  Hw10: NA %  Hw11: NA %  BN12: NA %  Final: NA %

... what if ...

david49's Grades

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<thead>
<tr>
<th></th>
<th>Hw1</th>
<th>Hw2</th>
<th>Hw3</th>
<th>Hw4</th>
<th>Hw5</th>
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<th>Hw6</th>
<th>Hw7</th>
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Academic integrity

• Quizzes, exams, homework *must be your own*
• *You* must hand in your work
  – **OK**: discussing course material, practice problems, study sessions, going over handed-back homework in groups
  – **Not OK**: copying or discussing answers, looking at or copying code or tests (even parts)
  – **Not OK**: talking through the assignment as you code with a classmate

• **Whiteboard policy**
  – **OK**: discussing *approaches* to solving a problem
  – *Wait at least 4 hours*, write solutions *individually*
  – **Not OK**: taking notes or pictures, memorizing answers

• **Never OK**: sharing/writing code together *(even pseudocode)*
  – We use MOSS to catch code duplication across semesters

*If you make a mistake, come to us, don’t let us come to you*
How to do Well in this Course

• Do not stress over grades
• Participate
• Manage your time wisely
  – *Don’t use late days in 1st half of course*
• Start homework early
• Get all the help you need
• Make time for fun
Activity debrief

• Without looking at your paper, write down as many of those words as you can recall

• How many people got more from the left column?
• From the right column?

• It’s going to be a lot easier if you take good handwritten notes
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A Mysterious Function Approaches ...