CS111: Fundamentals of Programming I

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My Bio

- From Dallastown, PA
- B.S., Gettysburg College
- M.S., Duke University
- Ph.D., University of Delaware
- For fun: ultimate, pop culture, ACC basketball, volunteer at the SPCA

Your Bios

- Where you're from
- Your major
- Your year
- Your favorite sport (spectator or participant)
- What activities you're involved in, what you do in your free time

Survey Says...

- What year are you?
- Who has used a computer regularly?
- Who has used the Internet regularly?
- Who has made a web page?
- Who has written a program?
- Why are you taking this course?
- What is computer science?

Discussion

What is Computer Science?
Know any famous computer scientists?

What is Computer Science?

"Computer Science is no more about computers than astronomy is about telescopes."
--Edsger Dijkstra

- What is computable?
- How can we compute X most effectively/ efficiently/accurately?
  - Organization of data
  - Optimize speed, space using optimum data structures, algorithms
  - Accurate modeling of "world"
  - Automation

Computer Science Fields

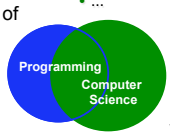
Systems
- Architecture
- Operating systems
- Networks
- Distributed and parallel systems
- Databases
- ...

Software
- Compilers
- Graphics
- Software engineering
- Software testing and verification,
- ...

Theory
- Algorithms
- Theory of computation
- ...

Other
- Artificial intelligence
- Robotics
- Natural language processing
- Bioinformatics
- Visualization
- Numerical analysis
- ...

- Often research involves combinations of these fields
- Not just programming!
  - But programming is a tool to do much, much more!

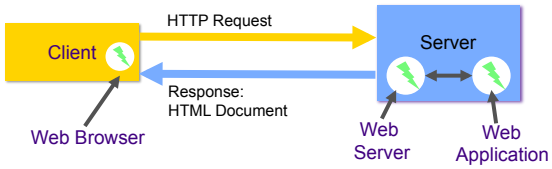


What I do **not** do as a Computer Scientist

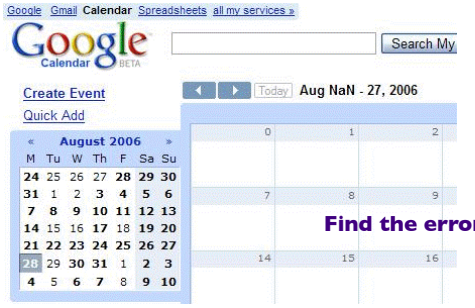
- Fix hardware
- Fix Microsoft Windows (or other operating systems) problems
- Fix Microsoft Office (or other desktop applications) problems

What I Do as a Computer Scientist

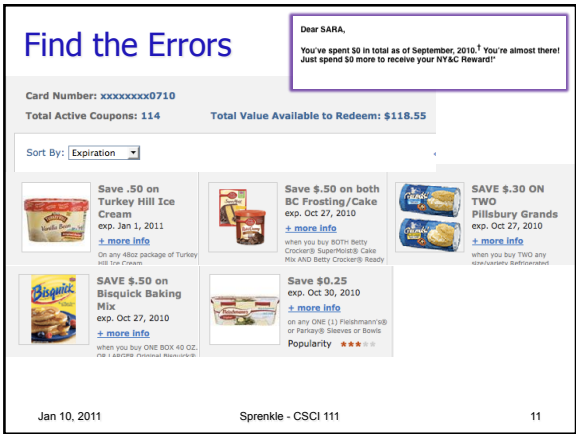
- Interests: Software testing, empirical studies, distributed systems
- Focus: Automated web application testing



What I Do as a Computer Scientist



Find the Errors



Matt Welsh

- Senior software engineer at Google
- Research: sensor networks
  - Variety of applications: monitor volcanoes, health care, …
- Wrote *Running Linux*

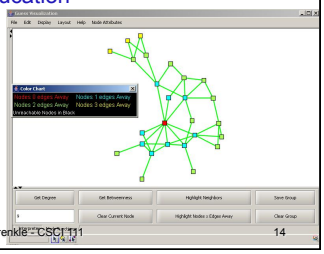
Matt at Volcán Reventador in Ecuador

Anne Van Devender '09

- Computer science major, concentration in women's studies
- Graduate student in Technology and Social Behavior program at Northwestern University
- Project: social network analysis of role model networks in Chicago public schools

Jeff Forbes

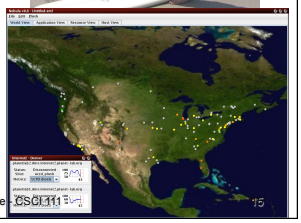
- Associate professor of the practice at Duke University
  - Focus: computer science education



- HarambeeNet: CS education via social networks
- Works with local Durham schools teaching CS with robotics

Jeannie Albrecht

- Assistant professor at Williams College
- Research: managing software that is running and communicating on computers around the world
- Hobbies: surfing, ultimate, rugby



Sue Lister

- Double major in CS and Psychology
- Interested in decreasing the division between the technological haves and have nots
  - Only 11% of Africans have Internet access
  - Cell phones are commonly used

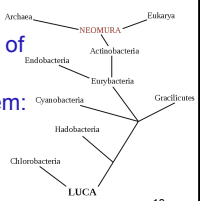
Sue with Alex, one of the computer teachers at Ketasco Secondary School, in the computer lab in Keta, Ghana

Christyann Pulliam

- Double major in CS and Political Science from Gettysburg College
- Law Degree from Wake Forest University
- Patent Examiner at the US Patent and Trademark Office
  - Focus: Search engines, DB apps

Tiffani Williams

- Computational biology (bioinformatics) and high-performance computing
- Develops software to analyze biological problems
  - Example: analyzing collections of evolutionary trees
  - Challenge beyond "real" problem: easy to use by biologists



Nina Bhatti

- HP Labs Principal Scientist
- Leads design for novel mobile technologies
  - System for matching your foundation, using pictures from your cell phone

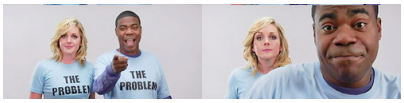
What This Course Is About

Problem Solving!

From *30 Rock*

Computational Problem Solving 101

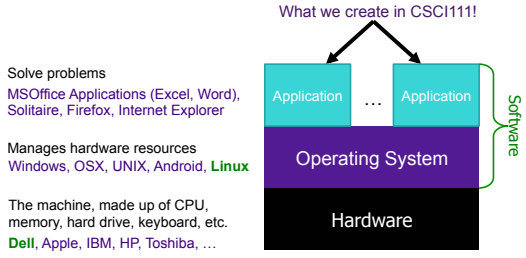
- **Computational Problem**:
  A problem that can be solved by logic
- To solve the problem:
  1. Create a **model** of the problem
  2. Design an **algorithm** for solving the problem using the model
  3. Write a **program** that *implements* the algorithm



Computational Problem Solving 101

- Algorithm: a well-defined recipe for solving a problem
  - Has a *finite* number of steps
  - Completes in a *finite* amount of time
- Program
  - An algorithm written in a **programming language**
  - Also called *code*
- Application
  - Large programs, solving many problems

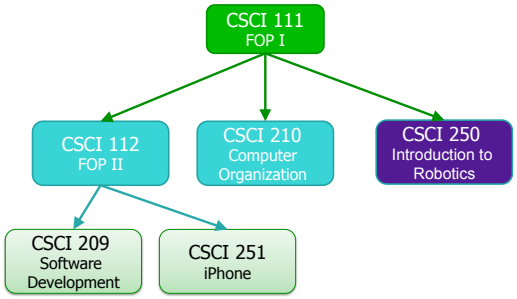
Basic Computer Architecture



What to Expect from this Class

- First programming course
- Lots to learn!
  - Introductions to a lot of new ideas
- Different way of thinking
  - Similar yet different from math
  - May get stuck but ask for help!
- Writing some basic programs
  - Foundations for more complex, sophisticated code

Where You Can Go From Here



Class Details

- Course web page
  - http://www.cs.wlu.edu/~sprenkle/cs111
  - Check schedule frequently for updates
- Monday, Wednesday, Friday lectures
  - Slides posted after class, in PDF format
  - Don't copy down slides verbatim
    - A lot isn't on the slides
    - Use PDF slides later to review
- Tuesday labs
  - Programming projects due on Friday
  - Parmly 405

Class Details

- 3 Exams
  - 2 Exams (see schedule online for dates)
  - Final Exam
- Discussion of broader issues in CS
  - Articles about computer science's effect on *everything*
    - Get big picture of CS
  - Write up on Sakai, due Fridays by 10 a.m.
  - Discussion on Fridays
  - Opportunities for extra credit for finding, reading, summarizing additional articles

Instructor Responsibilities

- Keep your interest in CS
- Prompt, constructive feedback on assignments
- Office hours:
  - Wednesday: 2:30-4:30 p.m.
  - Thursday: 1:30-3:30 p.m.
  - Email for appointments
- Respond within 24 hours to emailed questions

Student Responsibilities

- Check W&L email and course web page frequently for updates
  - Review entire syllabus online
- Attend and participate in class and lecture
  - Mandatory attendance
  - Be respectful to other students
- Arrive promptly to lecture/lab
  - Bring your notes and handouts
- Turn off cell phone
- Be patient, flexible, and learn from mistakes

Optional Textbook

- No *required* textbook
- Two choices at bookstore
- Can use as a reference
  - Can ask to borrow a book from me
  - Also many online resources

Consequence: my lecture slides and handouts and your notes are vitally important
- Reference *frequently*
- **Bring with you to lab!**

Honor

- You may discuss programming assignments *informally* with other students
  - Sharing the **code** is an honor violation
  - Do **not** share your password
- You should know where to draw the line between legitimate outside assistance with course material and outright cheating
  - Students who obtain too much assistance without learning the material ultimately cheat themselves
- If you have any uncertainty about what this means, consult with me before you collaborate
- All written assignments should be done individually

Your TODO List:

- Review the course web page
  - Schedule (may change)
- Due Friday
  - First CS issues reading/writeup
  - Tuesday's lab/assignment

Summary

- Meet & greet
- What is computer science?
- What is this class?