CS111: Fundamentals of Programming I

Professor Sprenkle
sprenkles@wlu.edu

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

Your Bios

- Where you're from
- Your major
- Your year
- Your astrological sign
- 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"

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 error(s)!

Matt Welsh

- Assistant professor at Harvard University
- Research: distributed systems and networking
  - Sensor networks to monitor volcanoes
- Wrote *Running Linux*

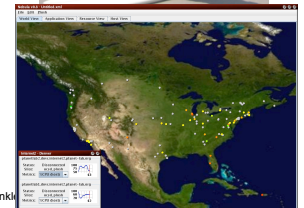Prof. Welsh at Volcán Reventador in Ecuador

Jeannie Albrecht

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

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

Sue Lister

- Recent graduate of the University of Delaware
- Double major in CS and Psychology
- Interested in decreasing the division between the technological haves and have nots
  - Only 3% 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
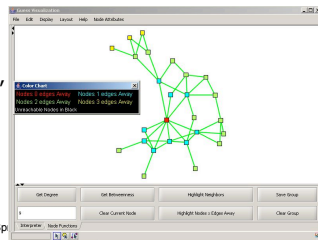

Jeff Forbes

- Assistant professor of the practice at Duke University
- Research:
  - computer science education, intelligent control and robotics, reinforcement learning, and social networks
  - HarambeeNet: CS education via social networks

Nina Bhatti

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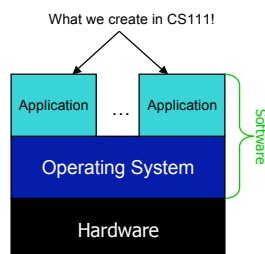 - System for matching your foundation, using pictures from your cell phone

---

Basic Computer Architecture

What we create in CS111!

Solve problems
MSOffice Applications (Excel, Word), Solitaire, Firefox, Internet Explorer

Manages hardware resources
Windows, OSX, UNIX, Linux

The machine, made up of CPU, memory, hard drive, keyboard, etc.
Dell, Apple, IBM, HP, Toshiba, …

Application … Application

Operating System

Hardware

Software

Computational Problem Solving 101

- Computational Problem
  - A problem that can be solved by logic
- To solve the problem:
  - Create a **model** of the problem
  - Design an **algorithm** for solving the problem using the model
  - 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

What This Course Is About

- CS111
  - Introduction to problem solving
    - Algorithms, dealing with information
  - Introduction to programming (Python)
  - Introduction to UNIX/Linux
  - Introduction to broader issues in CS
- CS101
  - Survey of computer science topics: algorithms, circuits, low-level instructions, web/databases

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 me for help!

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*
  - Write up on blog, 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
- Turn off cell phone
- Be patient, flexible, and learn from mistakes

Honor System

- You may discuss programming assignments informally with other students
  - Sharing the **code** is an honor violation
- Students should know where to draw the line between getting 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
  - Exam dates
- Read Chapter 1 of Text Book
  - 1.3 History of Computing -- skim only
  - 1.4 will help for tomorrow's lab

- Due Friday
  - First CS issues reading/writeup
  - Tuesday's lab/assignment

Summary

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