CS 161
Intro to CS I

What is CS all about?
Exercise #1 – Extra Credit

• Get into groups 4-5.
• Everyone write their name on the piece of paper.
• Have someone record each person’s major and why you decided to take CS 161.
Computers Are Everywhere

• Examples:
  – homes, offices, rooms/servers, phones, pacemakers, cars, etc.

• What is the difference b/w these?
  – Complexity
  – Size
What is a computer?

• A Computational Device
  – It computes (input-> processing -> output)
  – Modern: device that can be programmed to carry out an algorithm.

• What is Computer Science?
  • design of algorithms
  • problem solving
  • study of computational devices / hardware
  • programming
  • software systems
  • operating systems
  • languages
What is an algorithm?

• Step-by-step description of how to accomplish a task, i.e. recipe
• Algorithmic thinking
• Expressed in any language
  – Natural
  – Programming
What is programming?

- Problem Statement
- Solve the Problem
- Specify Algorithm
- Algorithm -> Computer Language

- Why do we teach programming 1st?
  - limitations
  - broaden horizons
  - abstractions (understand)
  - interest level
  - testing to see if it works
Hardware vs. Software

- Computer: **machine** that manipulates data and carries out **set of instructions**

- Hardware
  - CPU
  - RAM
  - Hard Disk

- Software
  - Programs
Software/Programs

- Primary piece of software on computer?
- What is its purpose?
- What are applications?

OS - operating system
Interface between programs & hardware
Digital Realm

• Based on discrete #s
  – Specifically: Circuits

• Binary, i.e. base 2
  – 0 or 1

• What base do most people use?
  – What is the range for each digit?

• What is Hexadecimal?, i.e. base 16
  – What is the range for each digit?
Decimal, Binary, & Hex

• Decimal
  – Powers of 10
• Binary
  – Powers of 2
• Base X to Base 10 conversion
  – 32 (base 10): \(3 \times 10^1 + 2 \times 10^0 = 32 \text{ (base 10)}\)
  – 100000 (base 2): \(1 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 32 \text{ (base 10)}\)
  – How do we express 35 (base 10)
    • base 2
    • base 16
Quick Demo...
More Binary

• What is each digit called?
• What is a Byte?
• How many numbers can be expressed in a Byte?
  – Signed/Unsigned
• What is the smallest number?
• What is the largest number?
What does this mean for us?

• Class Discussion...