CS 160
CS Orientation

Intro to CS & Number Conversions
Computers Are Everywhere

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

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

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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
Hardware vs. Software

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

  - Hardware
    - CPU
    - RAM
    - Hard Disk

  - Software
    - Programs

Hardware

More expensive or takes longer to access

Software

HW

SW
Software/Programs

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

• Writing **code** that a computer can **execute**
  – Does that mean we have to write in binary?  

• High-level language
  – Interpreted  
  – Compiled
    • High-level -> machine language
    • High-level -> intermediate language
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): $3 \times 10^1 + 2 \times 10^0 = 32$ (base 10)
  – 100000 (base 2): $1 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 32$ (base 10)
  – How do we express 35 (base 10) in base 2 vs. base 16?