Introduction to Computer Science and Programming in C

Session 2: September 4, 2008
Columbia University
Review

- Went over syllabus
- Algorithms - systematic methods to solve problem.
  - Embarrassing addition example
- Characteristics of C: high-level, compiled, etc.
Today

- Very brief history of computers
- Basic Architecture of the Modern Computer
- Cunix tutorial
Links

- [http://www.columbia.edu/acis/history/](http://www.columbia.edu/acis/history/)
Early Computers

- Analog computers.
- vs. digital
Early Digital

- First half of 20th century, punch cards.

- Relays

- Vacuum tubes

- Programming: physically rearrange wires.
Modern Computers

- Stored-program
- von Neuman Architecture
- Magnetic storage, optical storage, etc.
  - non-volatile
Modern Computers

- Volatile memory (vs. non-volatile)
  - Random Access Memory (RAM)
  - Faster, more expensive
- Central Processing Unit (processor)
- Input/Output (I/O)
Modern Computers

- **Operating systems** (OS) manage for us
  - Unix, Linux, DOS, Windows, Mac OS, etc.
- Programs access disk, RAM and I/O through OS
- Virtual memory
Binary Representation

- **Binary** - taking two values
- **bit** = 0 or 1
- **byte** = 8 bits
- kilobyte, megabyte, gigabyte, terabyte
Binary Representation

- Using one bit, we can represent true/false.
- Using one byte, how to represent the numbers 0 through 10?
  - Base-2
  - Addition and multiplication still work!
  - We can represent $2^8$ values (counting 0)
Binary Representation

- [0,255]
- or [-127,127]
- What about characters?
  a-z, A-Z, 0-9, punctuation...
- American Standard Code for Information Interchange (ASCII)