CSE 113 A

August 31 – September 4, 2009
Announcements

- If you have not picked up a syllabus, please do so.

- Assignment #1 – sign and return form on last page of syllabus – must be turned in by end of class Monday, September 14\textsuperscript{th} to receive full credit.

- Note course website on syllabus – UBlearns will only be used for posting grades (until October 9\textsuperscript{th}), so please make sure to check the website for course schedule and other information (including these slides which will be linked from the course schedule page at the end of each week).
What does a computer understand?

- 0’s and 1’s (zeros and ones)
Bits and Bit Strings

- The 0 or 1 is called a binary digit (bit).
- A sequence of bits is called a bit string.
- 0100101 is a bit string
  - What does it mean/represent?

- 37
- 91
- 0%
Interpreting Bit Patterns

- Binary (non-negative numbers)
- Two’s complement (positive & negative integers)
- IEEE 754 (approximate floating point values)
- ASCII/EBCDIC/Unicode (text: characters)
Conversion from decimal to binary

3.7
30 + 7
3 \times 10 + 7 \times 1
3 \times 10^1 + 7 \times 10^0

111
1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0
1 \times 4 + 1 \times 2 + 1 \times 1
4 + 2 + 1
"Seven"
Fixed amount of bits creates problems

- Let’s go to the spreadsheet
How do we decode this?

0010101010101010101000000010111111101010101010011010010010010010010001111111101001011110100110110001010101010101010101010101011100111000111001001111001000111110100010100101010101110011100011100100111100011110100010100101010101010111001110001110010011110010001111101010101111010010100101001001001110100100100101001010011000101100100011110101001110101001010010100100111001100101011111010001010010011100110010101111101000101001010101010101011100111000111001001111000011110100101001010010100111010010010010100101001100010110010001111010101110101001010010100101010101110010101001010101011110100110100100111101001001001001001001111010010111010010100101001010011100111001010101010111010110010101
010101001001001001001000111111001011101001100111101001010010100100100111010010010010010100101001100010110010001111010010111010010100101001010010100111001100101011111010001010010010100101001110011001010111110100010100100111101001001001001001001111010010111010010100101001010011100111001010101
How many distinct 8-bit wide bit strings are there?

256 distinct bit patterns
Encoding machine instructions

- Use bits to encode those as well

- When we want the machine to follow those instructions:
  - Fetch
  - Decode
  - Execute
Assembly language

- ADD r1 r2
- STOR r2 r1
- SUB r3 r1
High-level languages

- Step closer to natural language from machine language.
Tools

- Editor: place to type the program’s text

- Compiler: translates what’s in the editor to a form the computer understands

- Execution Environment: to run our program
Our Language: Java

- High level programming language
- Object-oriented