

CSE 113 B

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 14th to receive full credit.
- ⦿ Note course website on syllabus – UBlerns will only be used for posting grades (until October 9th), 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?

- ① 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

→ 90



INTERPRETING BIT PATTERNS

- ◎ Binary (non-negative numbers)
- ◎ Two's complement (positive or negative integers)
- ◎ IEEE 754 (approximate real numbers)
- ◎ ASCII/EBCDIC/Unicode (characters)



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CONVERSION FROM DECIMAL TO BINARY

$$\begin{array}{l} 37 \\ \swarrow \quad \searrow \\ 3 \quad \quad 7 \\ \text{tens} \quad \text{ones} \\ \text{place} \quad \text{place} \\ 3 \times 10 + 7 \times 1 \\ 3 \times \underline{10^1} + 7 \times \underline{10^0} \end{array}$$

$$\begin{array}{l} 111 \\ 1 \times \underline{2^2} + 1 \times \underline{2^1} + 1 \times \underline{2^0} \\ 1 \times 4 + 1 \times 2 + 1 \times 1 \\ 4 + 2 + 1 \\ \text{"seven"} \end{array}$$



$$\begin{array}{r} 11 \\ 66 \\ +49 \\ \hline 115 \end{array}$$

$$\begin{array}{r} 111 \\ 101 \\ + 111 \\ \hline 1100 \end{array}$$

$0+1=1$
 $1+0=1$
 $1+1=10$
 $1+1+1=11$



HOW DO WE DECODE THIS?

⊙ 001010101010101010000001011111101010101
010001101001001001001001000111111001011
101001100111010001010010011100110010101
1111010001010010101010101110011100011
100100111100000111110101010111101001010
010100100100111010010010010100101001100
010110010001111010010111010100101001010
010101010111001010100101010101111010011
010010011110100100100100100100010101101
010101010110101101010101010101010101010
10111100001101011101001010010010100101
001011100111001010101010111010110010101



QUESTION

- ⊙ How many distinct 8-bit wide bit strings are there?

256 different characters



ENCODING MACHINE INSTRUCTIONS

- ① Use bits to encode those as well
- ① When we want the machine to follow those instructions:
 - ① Fetch
 - ① Decode
 - ① Execute



ASSEMBLY LANGUAGE

- ⊙ ADD r1 r2
- ⊙ STOR r2 r1
- ⊙ SUB r3 r1



HIGH-LEVEL LANGUAGES

- ① Step closer to natural language from machine language.



TOOLS

- ③ Editor — place to type our program's text
- ③ Compiler — translate program to a lang the machine will understand
- ③ Execution Environment
 - ↳ to ~~run~~ run the program



OUR LANGUAGE: JAVA

- ① High level programming language
- ① Object-oriented

