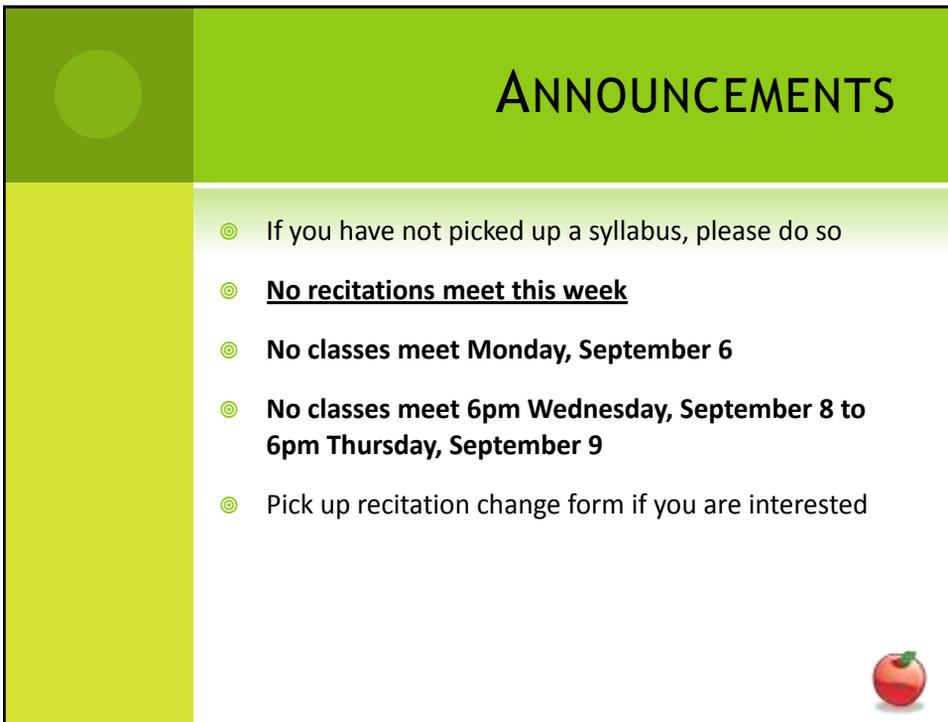


CSE 113 B

August 30 – September 3, 2010



ANNOUNCEMENTS

- ⊙ If you have not picked up a syllabus, please do so
- ⊙ **No recitations meet this week**
- ⊙ **No classes meet Monday, September 6**
- ⊙ **No classes meet 6pm Wednesday, September 8 to 6pm Thursday, September 9**
- ⊙ Pick up recitation change form if you are interested



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WHAT IS PROGRAMMING LIKE?

- ⊙ Structured
- ⊙ Specific
- ⊙ Detail-oriented
- ⊙ Organized
- ⊙ Well-thought out
 - ⊙ Considers many possibilities



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WHAT IS PROGRAMMING LIKE?

- ⊙ It's creative
- ⊙ It's fun
- ⊙ It's an art... sometimes you need to practice to get good at it



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WHY?

- ⦿ Programming has all of those characteristics (and more) mainly because of the underlying structure of the computer itself.



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.
- ⦿ 8 bits together is called a byte
 - ⦿ 1024 bytes = 1 kilobyte (KB)
 - ⦿ 1024 kilobytes = 1 megabyte (MB)
 - ⦿ 1024 megabytes = 1 gigabyte (GB)
 - ⦿ 1024 gigabytes = 1 terabyte (TB)



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WHAT DO THEY MEAN?

- ⦿ 0100101 is a bit string
 - ⦿ What does it mean/represent?



INTERPRETING BIT PATTERNS

- ⊙ Letters
- ⊙ Numbers
 - ⊙ Integers (whole numbers)
 - ⊙ Floating point (decimal numbers)
 - Why are there two types of numbers?



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FLOATING POINT NUMBERS ARE APPROXIMATIONS

- ⊙ See for yourself:
- ⊙ In Excel, type 1 in a cell and type .9999 in another. In a third cell, subtract .9999 from 1 and see result (.0001)
- ⊙ Now, format the cell to show 17 decimal places and note that the answer is not correct.



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INTERPRETING BYTES

- ⊙ If we have 8 bits, how many unique bit strings can we make?
- ⊙ $2^8 = 256$ unique bit strings
- ⊙ How did we figure this out?



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HOW MANY BIT STRINGS?

1-bit strings

0 (2)
1

2-bits strings

00 10
01 11 (4)



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HOW MANY BIT STRINGS?

3-bit strings

000

011 110

001

100

111

010

101

(8)



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HOW MANY BIT STRINGS?

$$2^{16} = 65,536$$



ENCODING MACHINE INSTRUCTIONS

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



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PROGRAMMING LANGUAGE

- ⦿ Language we can use to write computer programs
- ⦿ Similar to and different from natural language.



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SIMILARITIES TO NATURAL LANGUAGE

- ⊙ Syntax - *Grammar*
- ⊙ Semantics - *Meaning*
- ⊙ Written down
- ⊙ Read



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DIFFERENCES FROM NATURAL LANGUAGE

- ⊙ Rarely spoken



TOOLS

- ⊙ Editor - *place we type the program*
- ⊙ Compiler - *Translates our program into a language the computer understands*
- ⊙ Execution Environment
↳ place to run our programs



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OUR SANDBOX: GREENFOOT

- ⊙ Environment designed for introductory programmers
- ⊙ Simulations
- ⊙ Worlds and agents



OUR LANGUAGE: JAVA

- ⊙ High level programming language
- ⊙ Object-oriented

