CS 125 - Lecture 2

Objectives:

- Algorithms and Pseudo code – Motivation and Examples
- Mental Model of Memory
- Designing Data Structures

To Do:

- Reading assignment before next lecture (see Lecture page).
- Sign up for Turing's Craft: (See CS125 FAQ website)
- Laptop setup issues? Post screenshot on Piazza
- Wednesday Debug-Your-Brain starts in 9 days time.

1a. **Computer Science Terminology** – did your neighbor do the readings?

Discuss with your neighbor what a Computer Scientist means by the following terms and give an example of each:

- algorithms:
- primitives:
- composition:
- abstraction:
- memory locations:
- address:

2. Using 8 bits, **write these decimal numbers in binary representation**:

3_{10} =

10_{10} =

67_{10} =

7_{10} =

14_{10} =

254_{10} =

1b. Q1: How many bits are in a byte?

Q2: What number is represented by the decimal pattern 7138?

Q3: What number is represented by the bit pattern 010110?

3. **Binary representation is an abstraction**

010110_2

4. **Arithmetic can be done with binary numbers:**

$$\begin{array}{r} 10010_2 \\ +\ 00110_2 \\ \hline \\ \end{array}$$

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5. **Representing algorithms?**
(http://userpages.wittenberg.edu/bshelburne/Comp150/Algorithms.htm)

- Use natural languages
- Use formal programming languages
- **Pseudo-Code** - natural language constructs modeled to look like statements available in many programming languages

Pseudo-Code is a numbered list of instructions to perform some task.

1. *ordered sequence of operations*
2. each instruction is computable
3. complete

Three Categories of **Algorithmic Operations:**

1. sequential operations – instructions executed in order
2. conditional "question asking" operations – select from alternatives
3. iterative operations (loops) – repeating a block of instructions

6. Computing a Quiz Average: **Pseudo-code to calculate a quiz average**

1. get number of quizzes
2. sum := 0
3. count := 0
4. while count < number of quizzes
   - get quiz grade
   - sum = sum + quiz grade
   - count = count + 1
5. average = sum / number of quizzes
6. display average

7. **Write pseudo-code to print the highest quiz score:**

8. **Describe a linear search**