CS 161
Intro to CS I

What is CS all about?
Odds and Ends

• Go to Lab this week (laptop required)
• Assignment 1 posted and can upload to Peerceptiv
• Math study: Elise.Lockwood@oregonstate.edu

• Questions?
How to Be Successful

• Read and listen carefully
• Start assignments early
• Be proactive with absences and issues that arise in the term
• Get help when you need it
Help Hierarchy

- Reread assignment, lecture slides, labs, syllabus
- Google/Bing/Open a textbook
- Ask a friend
- Ask a TA
- Ask Jennifer

- All Emails Should Include:
  - What your problem is
  - What you have tried
  - What would help you most
  - Section number (if relating to a grade issue)
Computers Are Everywhere

• Examples:
  – homes, offices, rooms/servers, phones, pacemakers, cars, etc.

• What is the difference b/w these?
  – Complexity
  – Size
What is a computer?

- A Computational Device
  - It computes (input -> processing -> output)
  - Modern: device that can be programmed to carry out an algorithm.

- What is Computer Science?
What is an algorithm?

• Step-by-step description of how to accomplish a task, i.e. recipe
• Algorithmic thinking
• Expressed in any language
  – Natural
  – Programming
What is programming?

- Problem Statement
- Solve the Problem
- Specify Algorithm
- Algorithm -> Computer Language

- Why do we teach programming 1st?
Hardware vs. Software

- Computer: **machine** that manipulates data and carries out **set of instructions**
- Hardware
  - CPU
  - RAM
  - Hard Disk
- Software
  - Programs

Registers + cache
Software/Programs

• Primary piece of software on computer?
• What is its purpose?
• What are applications?
Digital Realm

- Based on discrete #s
  - Specifically: Circuits
- Binary, i.e. base 2
  - 0 or 1

open/close
on/off
1/0
More Binary

- What is each digit called?
- What is a Byte?
- How many numbers can be expressed in a Byte?

8 bits
2^8 possible #s
What does this mean for us?

• Unsigned
  – What is the smallest number? $\emptyset$
  – What is the largest number? $15 = (2^4) - 1$

• Signed
  – What is the largest number? 8 positive #s $0 - 7$
  – What is the smallest number? 8 negative #s $-1 - -8$

 nibble - 4 bits

$2^4 = 16$ possible #s

because start at $\emptyset$

$\frac{1}{2} = 8 \quad \frac{1}{2} = 8$

negative + positive #s because 1st bit is sign (+/-)
Programming

• Writing **code** that a computer can **execute**
  – Does that mean we have to write in binary?
• High-level language
  – Translated Continuously during runtime
    • Interpreted
    • Just in time compilation/caching
  – **Translated Prior/Ahead of time to runtime**
    • High-level -> machine language
    • High-level -> intermediate language
Linux commands

- `cd` command changes directory/folder.
- `ls` command lists the contents of a directory/folder.
- `ls -al` command gives a long listing, which includes hidden system files.
- `mkdir` command makes a new directory/folder.
- `cd` command changes directory/folder.

1. `vi` is an alias for `vim` (vi improved).
2. `vi` is a text editor (just like word notepad).
3. `hello.cpp` is the file we are creating, which is a C++ file.
001 Code/002 will finish Friday

```
#include <iostream> //library

int main() {
    std::cout << "hello everyone" << std::endl;
    return 0;
}
```

- Print to standard output which is the screen
- `cout` is used to output to the screen
- `endl` resets the newline

Vi has 2 modes: insert and command mode

1. Press 'i' to enter insert mode
2. Show you are in insert mode
3. Press Esc to get back to command mode

You must have this in C/C++ programs
Compile/Execute C++

- `g++ hello.cpp` translates and compiles C++ to machine code.
- `ls` lists files in the directory.
- `./a.out` runs the executable.
- `more a.out` views the contents of the file.

Tips:
- Use `-o` to rename the executable.
- The default name is `a.out`.

Observations:
- The output of compiling and running C++ code is shown.
- The terminal displays messages such as `173%` and `174%` indicating the progress of the compilation and execution.
- The file `a.out` is mentioned as both a binary file and not a text file.
C++ Programming Environment

- Create a program: `vim hello.cpp`
- Compile program: `g++ hello.cpp -o hello`
- Run program: `./hello`
- Example: `hello.cpp`

```cpp
#include <iostream>
int main() {
    std::cout << "Hello CS 161 Class!!!";
    return 0;
}
```
Our first C++ program!

```cpp
#include <iostream>
int main() {
    std::cout << "Hello CS 161 Class!!!";
    return 0;
}
```

- **Libraries**
  - Example: `#include <iostream>`
- **Functions**
  - Perform particular action/computation
  - Requires special function: `main`
    - `int main() { .... }`
- **Statements**
  - Ended by semicolon
Comments

• Ignored by compiler
• Comment a block of code: /*.....*/
• Comment one line of code: //
• Why use these?