CS 161
Intro to CS I

Beginning to Program

Odds and Ends

- Class Website (not Canvas)
  - Labs, assignments, and recitations are posted
  - Lab/recitation times, office and grading hours, and TA/instructor information
  - Slides and course videos
- Labs (laptop)/Recitations (no laptop) meet this week!!!
- Recitation Quiz #1 posted, due Friday 11:59pm (email to TA with "CS 161 Recitation Quiz" in subject)
- Assignment #1 posted, due Sunday 11:59pm submit on TEACH

Reading/Assignments

- Read/Start Assignment 1 and Recitation Quiz
- Read assigned online resources!!!
- Recitations, Labs, and Office Hours are happening this week
  - Wed. 4-6 lab is in KEC 1005
  - All others DEAR 222
- Laptop required for Lab.
- Assignments must compile and run on ENGR!
- Demos start next week (no laptop required).
- Sign-up for demo on home page, after you submit your assignment.
- **Don't be scared!!!!**

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

C++ Programming Environment

- Type a program in a .cpp file, **vim hello.cpp**
- Compile program file, **g++ hello.cpp –o hello**
- Run the compiled version, **hello**
- Example: **hello.cpp**

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

Our first C++ program!

- Libraries
  - Example: #include <iostream>
- Functions
  - Perform particular action/computation
  - Requires special function: **main**
    - int **main**() {….}
- Statements
  - Ended by semicolon
  - Examples:
    - std::cout << “Hello World”;
    - return 0;

Comments

- Ignored by compiler
- Comment a block of code: /*…..*/
- Comment one line of code: //
- Why use these?
- What are you required to have right now?
  - Header at beginning of program

```
/*********************************************************
** Program: hello.cpp
** Author: Jennifer Parham-Mocello
** Description: This program prints hello world to the console
** Input: none
** Output: hello world text
*********************************************************/
```

More C++

- Programming Style: please read your class style guide
  - Program Header/Description
  - Placement of {}
  - Indentation: spaces vs. tabs
- String Literals (Strings)
  - Quotation marks not single quotes!
    - INCORRECT: std::cout << ‘Hello World’;
  - Do not span more than one line!
    - INCORRECT: std::cout << “Hello World”;

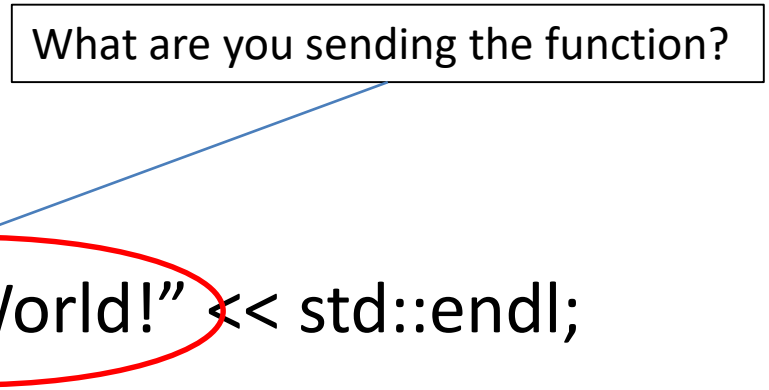
More C++

- Escape Sequences
  - Display special characters
  - Use backslash, \, before special character to print
- Examples:

  std::cout << “\“Hello World\”\n”;
- Refer online for common escape sequences: http://en.cppreference.com/w/cpp/language/escape

Demo…

Data Type



- What is data?
  - Information
  - Ex: std::cout << “Hello World!” << std::endl;
  - Simple value
    - Literals, e.g. 23, 79.5, “Hello”, etc.
- What is a data type?
  - Description of the kind of information
    - Primitive Data
    - User Created/Data Structures – (we will cover later)

Demo…

C++ Primitive Types

- char, double, float, int, long, short, bool
- Fundamental
  - **int**: whole numbers, e.g. 45, -89, 0
  - **double**: real numbers, e.g. 2.612, -30.5, 2.3e5
  - **char**: characters, e.g. ‘A’, ‘&’, ‘x’, ‘\’’
- Signed and Unsigned

Variables

- What is a variable?
  - Memory location with name and type to store value
- What is a declaration?
  - Statement requesting variable w/ name and type
  - Examples:

```
double height;
int age;
```

Demo…

Variables/Identifiers

- Identifier: name given to item in program
  - Ex. Variables and Functions
  - Start with letter
    - Letters include: upper-case, lower-case, underscore (_)
  - Followed by sequence of letters and digits
  - Good examples: hiThere, two_plus_two, _hello
  - Bad examples: 5dogs, hi-there, hello there
- Can't Use Keywords: http://en.cppreference.com/w/cpp/keyword

Variables

- How do we get a value in the variable?
  - Assignment Statement

    int age;

    age = 20;

    Or

    int age = 20;
  - = IS NOT equal to!!!!!
    - "gets" or "is assigned"

Printing Variables

- C++: cout
  - Example:

    std::cout << “The integer value is: ”<< value;

    variable to print
  - What about the newline?

Constants

- What is a constant?
- How do we define a constant?
  - Use of a macro
    - #define
    - Placed at top of program
    - No semicolon at end
    - Example: **#define MAX_SIZE 100**
  - Use of const
    - Same as declaring variable but const
    - Example: **const int MAX_SIZE = 100;**

Intro to Macros

- C++: <climits>
- Use MIN and MAX macros from library

  http://www.cplusplus.com/reference/clibrary/climits/

  (Note that the values listed are not the values on our system!!!)
  - INT_MAX
  - INT_MIN
  - LONG_MAX
  - LONG_MIN
  - SHRT_MAX
  - SHRT_MIN
- Remember unsigned too…

Demo…