CS 161
Intro to CS I
Beginning to Program
Odds and Ends

• Office Hours in KEC 1087 now!
• Assignments must compile and run on ENGR!
• Assignment #1 questions.

Don't freak out!
Let’s Revisit Binary

• How many numbers can be expressed in a Byte? \(2^8 = 256\)
  - Signed/Unsigned
  - Signed: \(-128\) to \(127\)
  - Unsigned: \(0\) to \(255\)

• What is the smallest number?

• What is the largest number?
Comments

• Ignored by compiler
• Comment a block of code: /*.....*/
• Comment one line of code: //</br>
• Why use these? anyone = who reads your code
• What are you required to have right now?<br>
  – 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
  /*******************************************************************************/
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;
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, refer to online resources...
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:
    ```cpp
    std::cout << "The integer value is: " << value;
    ```
  – What about the newline?
Constants

- What is a constant?  
  - Can’t change

- 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;`
Demo...

```cpp
#include <iostream>
#include <climits>

using namespace std;

int main() {
    cout << "next line\n";
    cout << "hello everyone!" << endl;

    cout << "library int max: " << INT_MAX << endl;
    return 0;
}
```
Demo...

• g++ -E main.cpp (stop after preprocessor)
```cpp
#include <iostream>
#include <climits>
using namespace std;

int main() {
    int x=UINT_MAX; //unsigned max can't fit in signed variable
    cout << "next line\n";
    cout << "hello everyone!" << endl;
    cout << "library int max: " << INT_MAX << endl;
    return 0;
}
```
Demo...

- g++ main.cpp -Wall (turn all the warning on)
Expressions

• What is an expression?
  – Set of operations producing a value
    • Combining simple values
      12 * 4 + 6 * 10 vs. ((12 * 4) + 6) * 10
Expressions cont.

• Pieces of an Expression:
  – Operators
    • Indicate operation, e.g. +, *, /, -, %
  – Operands
    • Values in the expression
  – Evaluation
    • Process of obtaining results from operations on operands
Arithmetic Operators

- Add
  34 + 23
- Subtract
  34 - 23
- Multiply
  2 * 23
- Divide
  40 / 10
- Remainder/Mod
  34 % 5
Arithmetic

• Integer Arithmetic
  
  ```cpp
  std::cout << 3/8;  /*prints 0*/
  std::cout << 34/5;  /*prints 6*/
  ```

• Floating Point Arithmetic
  
  ```cpp
  std::cout << 34.0/5.0;  /*prints 6.8*/
  std::cout << 3.0/8;    /*prints .375*/
  std::cout << 3/8.0;    /*prints .375*/
  ```
Type Casting

• Casting

```cpp
std::cout << 34 / (int) 5.0; /*prints 6*/
std::cout << (int) (34 / 5.0); /*prints 6*/
std::cout << (float) 34 / 5; /*prints 6.8*/
```

• What is wrong with these?

```cpp
std::cout << (int) 34 / 5.0; /*prints 6.8*/
std::cout << (float) (34/5); /*prints 6.0*/
```