

CS 161

Intro to CS I

Beginning to Program

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 are you sending the function?

- 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/ Reading Into Variables

- C++: cout

- Example:

```
std::cout << "The integer value is: " << value;
```

variable to print



- What about the newline?

- C++: cin

- Example:

```
std::cin >> value;
```

Demo...

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...

Expressions

- What is an expression?
 - Set of operations producing a value
 - Combining literal values
 $12 * 4 + 6 * 10$ vs. $((12 * 4) + 6) * 10$
 - Combining variables
 $var1 * var2 + var3 * var4$ vs. $((var1 * var2) + var3) * var4$

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
 $34 \% 5$

Precedence

- What is precedence?
 - Binding power of operator
 - (*, /, %) vs. (+, -)
- How do we override precedence?
 - Parenthesis!
- Examples:
 $12 * 4 + 6 * 10$ vs. $((12 * 4) + 6) * 10$

Arithmetic

- Integer Arithmetic

```
std::cout << 3/8; /*prints 0*/  
std::cout << 34/5; /*prints 6*/  
int age=5;  
std::cout << age/2; /*prints 2*/
```

- Floating Point Arithmetic

```
std::cout << 34.0/5.0; /*prints 6.8*/  
std::cout << 3.0/8; /*prints .375*/  
float years=2.0;  
std::cout << age/years; /*prints 2.5*/
```

Type Casting

- Casting

```
std::cout << age / (int) years; /*prints 2*/
```

```
std::cout << (int) (age / years); /*prints 2*/
```

```
std::cout << (float) age / 2; /*prints 2.5*/
```

- What is wrong with these?

```
std::cout << (int) age / years; /*prints 2.5*/
```

```
std::cout << (float) (age/2); /*prints 2.0*/
```

Demo...