# CSCI 1500 Lab – C++

## Go through C0 – Intro to C++ PowerPoint and then answer the following:

Define the following:

1. Compiler – translates a program written in a high-level language to machine language.
2. Source Program – a program written in a high-level language.
3. Preprocessor (include example) – directives, preceded by #, that are examined before compilation of the code. #include <iostream>
4. Object Program – a structured design of objects, data and operations on that data.
5. IDE (which will we use) – Integrated Development Evironment which allows for source code editing, compiling, and debugging.
6. Library – a collection of code that can be imported into a c++ program.
7. Linker – links machine code with system resources.
8. Loader – places the program into main memory for execution.
9. List the steps required to write and execute a program written in C++
   1. Problem>analysis>algorithm design>coding>preprocessor>compiler>linker>library and loader>execution>results

## Go through C1 – C++ first steps PowerPoint and then answer the following:

In Code::Blocks (IDE) type the following code, then Build, and Run it.

#include <iostream>

using namespace std;

int main()

{

cout << "Welcome to C++ programming." << endl;

return 0;

}

1. What does this program display? Welcome to C++ programming.
2. Most C++ lines of code ends with what token (symbol) (also see slide 53)? ; semicolon
3. What does cout do (also see slide 40)? The equivalent Python command is: outputs to the display.
4. Add the following to the line after

cout << "Welcome to C++ programming." << endl;

cout << "7 + 8 is " << 7 + 8 << endl;

1. The difference between "7 + 8 is " and 7 + 8 is? (think data types) “7 + 8 is “ is a string stream whereas 7 + 8 is in int stream
2. The symbol << is? Stream identifier
3. What does endl do? Ends the line on the display
4. What does #include <iostream> allow (also see slides 44-46)? Allows use of input output commands.
5. What does using namespace std; allow (also see slides 44-46)? It adds all functions/methods from std.
6. Otherwise you would use std::cout and std::endl true
7. What do { and } start and end? The braces are not C++ statements, they are delimiters. Start and end the body of a function/program
8. What is int main() ? the main function in a program that calls other functions
9. Add a comment to the top of your program that includes your name, the date and the filename.
10. The symbol for a single line comment in a Python program is: #
11. The symbol for a single line comment in a C++ program is: //
12. The symbol for a multi-line comment in a Python program is: ‘’’ ‘’’ or “”” “””
13. The symbol for a multi-line comment in a C++ program is: /\* \*/
14. Is C++ case sensitive? yes
15. C++ data types fall into the following three categories (not a question):
    1. Simple data type (focus here)
    2. Structured data type (later)
    3. Pointers (later)
16. Give Simple data sub-type (where would you put int, bool, char, float, double)
    1. Integral (char, int, bool)
    2. Floating point (float, double)
    3. enumeration
17. How does double data type differ from float? What is the default? Double uses more memory default is double
18. Just as in Python we can do a type conversion or casting from one type to another.
    1. Implicit conversion is when one value of one type is converted to another type
    2. Explicit conversion using static\_cast<dataTypeName>(expression)
    3. You can also use dataType(expression) example double(25) = 25.0 and int(24.5) = 24 but static\_cast is more stable
19. Strings are enclosed in \_\_double quotes\_\_ while char (characters) are enclosed in \_single quotes\_\_\_
20. “” is \_\_double quotes\_\_\_\_\_\_\_\_
21. For the string s = “Because I’m happy” give the positive indices (index) and the length of this string: length = 17, index = [0, 17]

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| B | e | c | a | u | s | e |  | I | ‘ | m |  | h | a | p | p | y |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

1. Storing data in computer memory is a 2 step process in C++ (these two steps can be done in one statement)
   1. Instruct computer to allocate memory
   2. include statements to put data into memory
2. For a fixed quantity like 1 inch = 2.54 cm you can use a named constant. Give the syntax and a brief definition for a named constant (note: convention is for the identifier to be in uppercase letters):

const dataType identifier = value;

const double INCH = 2.54;

named constant: memory location whose content can’t change during execution

1. Describe what the parts of this command do:

const double CONVERSION = 2.54;  
  
const = makes it a constant

double = decimal point number, sets the type of the variable

CONVERSTION = the name of the identifier

= sets the name of the identifier equal to a value

2.54 = the value of the identifier

; = ends the statement

1. Note: convention is to start the variable with a lowercase letter and if multiple words capitalize the first letter of the subsequent words. Define Variable: Give syntax for declaring one variable or multiple variables: And give some examples:  
     
   dataType identifier;  
   dataType identifier, identifier, identifier;

int rate; wages;

1. You must declare all identifiers before you can use them. Therefore, to use a named constant or a variable you must first declare them. What happens if you don’t declare them first?

You will get a runtime error.

1. After you have declared the variable what two ways in C++ can you place data into a variable:
   1. assignment statement
   2. input statements
2. Give the syntax for the variable assignment statement. A variable is said to be initialized the first time a value is placed in the variable.

wages = 15;

1. In C++ the = token is called: assignment token
2. Walk-through this example, give a line-by-line description of the values of the variables after the execution of each line:
   1. int num1, num2, num3;

all three are null

* 1. num1 = 18;

num1 now equals 18, other two remain null

* 1. num1 = num1 + 27;

num1 now equals 45, other two remain null

* 1. num2 = num1;

num2 now equals 45 as well as num1, num3 remains null

* 1. num3 = num2 / 5;

num1 and num2 remain 45, num3 now equals 9

* 1. num3 = num3 /4;

num1 and num2 remain 45, num 3 now equals 2.25

1. In Python, count +=1 incremented by one and count -= 1 decremented by one. In C++ there are two equivalent statements for each. They are:

++variable or variable++ for increment either pre or post

---variable or variable—for decrement either pre or post

1. What is the difference between these two pre-increment and post-increment (what is the value of x and y after both lines execute):

x =5;

y = x++;

x =5;

y = ++x;

On the left, x = 5, y = 6, and on the right, x =6 and y = 5.

1. As in Python, in C++ \ is the escape character and \n is (also take note of other escape sequences): \n, \t, \b, \r, \\, \’, \”
2. Many functions and symbols needed to run a C++ program are found in libraries. Every library has a name and is referred to by a header file. Preprocessor directives to include header files are placed at the first line of the program so that the identifiers declared in the header files can be used throughout the program (remember you have to declare an identifiers before you can use it). The general syntax for to include a header file is: #
3. The specific preprocessor directive needed to use the string data type is: #include <string>
4. Now do HW 13 problem 1: