**Lab Sections**

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Simple Types

**Declarations of Simple Types**

1. **Objectives**

**After you complete this experiment you will be able to:**

1. **discuss the amount of memory a Boolean, character, integer, float and double require**
2. **declare a Boolean, character, integer, float and double**
3. **compare Booleans, characters, integers, floats and doubles**
4. **Introduction**

Variable declarations tell the compiler how much memory to use when assigning values to a variable, and what operations can be performed on that variable.

1. **Definitions**

We will define several variable types that you will be using early in the semester. They are as follows:

1. **bool** refers to a Boolean type. If it holds a value equal to 0 it is false; otherwise it is true.
2. **char** refers to character type. It can hold any integer that represents a character (symbol).
3. **int** refers to integer type. It can hold any integer of a size specified by your system.
4. **float** refers to float type. The float type is a single-precision, floating-point number (positive or negative).
5. **double** refers to double type. The double type is a double-precision, floating-point number (positive or negative). It can be larger or equal to the size of a float.

More information on these and other variable types can be found in your course textbook and on the web.

1. **Experiments**

**Step 1: In this experiment you will determine how much memory a simple variable requires.**

**Enter, save, compile and execute the following program in MSVS. Call the new project “SimpleTypeExp1” and the program “simpleTypeDecls1.cpp”. Answer the questions below:**

#include <iostream>

using namespace std;

int main()

{

bool response;

char character;

int integer;

float single\_precision\_number;

double double\_precision\_number;

cout<<"A boolean uses "<<sizeof(bool)<<" bytes."<<endl;

cout<<"A character uses "<<sizeof(char)<<" bytes."<<endl;

cout<<"An integer uses "<<sizeof(int)<<" bytes."<<endl;

cout<<"A float uses "<<sizeof(float)<<" bytes."<<endl;

cout<<"A double uses "<<sizeof(double)<<" bytes."<<endl;

return 0;

}

1. Referring to the program in Step 1 (simpleTypeDecls1.cpp), please discuss the output(if any), and any errors or warnings your compiler gives.
2. Please try running this program on another computer, if possible. Explain your observations.
3. What is the magnitude of the largest positive value you can place in a bool? a char? an int? a float? a double? (hint: Wikipedia “limits.h”.)

**Step 2: Enter, save, compile and execute the following program in MSVS. Call the**

**project“SimpleTypeExp2” and the program “simpleTypeDecls2.cpp”. Answer the questions**

**below:**

#include <iostream>

#include <iomanip>

using namespace std;

int main()

{

bool response = 234;

char character = 68;

int integer = 123.456789;

float single\_precision\_number = 1234.567890123456789;

double double\_precision\_number = 1234.567890123456789;

cout<<"response = "<< response <<endl;

cout<<"character = "<< character <<endl;

cout<<"integer = "<< integer <<endl;

cout<<"single\_precision\_number = "<< setprecision (17)

<<single\_precision\_number<<endl;

cout<<"double\_precision\_number = "<< setprecision (17)

<<double\_precision\_number<<endl;

return 0;

}

1. Please explain each line of output.
2. Make the following changes to the program in Step 2 (simpleTypeDecls2.cpp) and

explain the output you get.

* change the value of “response” to 0 (zero).
* change the value of “character” to ‘A’