

Simple Types

Lab Sections

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Declarations of Simple Types

1. Objectives

After you complete this experiment you will be able to:

- a. discuss the amount of memory a Boolean, character, integer, float and double require
- b. declare a Boolean, character, integer, float and double
- c. compare Booleans, characters, integers, floats and doubles

2. 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.

3. 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.

4. 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;
}

```

Question 1: Referring to the program in Step 1 (simpleTypeDecls1.cpp), please discuss the output(if any), and any errors or warnings your compiler gives.

Question 2: Please try running this program on another computer, if possible. Explain your observations.

Question 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;
}

```

Question 4: Please explain each line of output.

Question 5: 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’

Sample Answer Sheet

Name:

Email:

Znumber:

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Answers:

1.

2.

3.

4.

5.