Variables in C++

This lesson informs about where variables are stored in computers, the acceptable variables names and the min/max memory allocated to them

We'll cover the following

Introduction

Variables are used by the computer, as *specified* by you in your program, to record the *current state* of play at each step of the execution of your program so that your computer can suspend execution of your program at any point, step away, attend to some other matter, return and then continue its execution of your program without losing any information in the process.

Where are variables held?

Variables are located in the minds of programmers and in the memory of computers. Programmers use *symbolic* names to describe variables in their minds, for instance:

- “the depth of the snow on the mountain”

or

- “the amount of money in the customer’s bank account”.

Ultimately, for reasons of efficiency, locations in computer memory are referred to by *numbers* often represented in awkward **hexadecimal** notation, for example, **0xcafebabe**.

> **Note:** The compiler assists programmers by managing the relationship

> between the *symbolic* and *numeric* representations of the locations of variables to reduce the number of errors that programmers would surely
>
> make if there were required to refer to every variable they have in mind purely by its current location in the memories of their computers.

C++ requires the programmer to use names constructed solely from letters chosen from **a through z**, **A through Z**, and numbers are chosen from **0 through 9**. C++ considers *uppercase* letters to be different from *lowercase* letters.

> **Important Note:** Names **must** start with a letter.

Thus C++ allows :

a

to be used as a *variable* name. Some examples of types of variable names that are permitted by C++ include:

```
#include <string>
using namespace std;

int main() {
  int A;
  int a1;
  float alpha;
  string abc22;
  double snowDepth;
  double amountInCustomerAccount;
}
```

Customer's account balance is not a valid variable name in C++ because it contains *spaces* which are **not** allowed and because it contains an *apostrophe* which is also **not** permitted by C++ in *variable* names.

However, while the definition of the C++ language allows other letters to be used in variable names such as:

```
α
```

most C++ compilers and editors fail to support such letters reflecting a bias that

unfortunately you will be required to perpetuate if you wish to publish the source

code of your program.

Size of a Variable

C++ programs are expected to execute on physical computers that only have a finite amount of memory. Thus, the *smallest* amount of memory in C++ is that of a **character** variable which is **one** *byte*, and the *maximum* is the size of the memory implemented by the architecture of the specific computer the program is executing on.

Now that you have background information on variables in C++ let's learn the variable syntax in the next lesson.