Week 2 — Data Types with C++

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In a C++ program, types of objects (and identifiers) must be declared before those objects (and identifiers) are utilized.

The fundamental types in C++ include `short`, `int` and `long` for integers; `unsigned` for nonnegative integers; `float` and `double` for real values; `boolean` for logical values; and `char` for individual characters.

C++ compilers treat all real literals as being of type `double`. Programmers use `double` for real objects or `float` for real objects

The `char` type is used to represent single characters.

`char` literals must be enclosed in single quotes.

Escape sequences such as `\n` (new line) and `\t` (tab) are used for characters that have a special purpose.

`#include` is the pre-processing directive in directive in C++.

Some C++ key words (reserved words) include:

```
bool            int

char            class

long            double

const           long

return          float
```

The `string` type is provided for processing strings of characters. The `<string>` library must be included before string objects can be declared.

An identifier may begin with a letter or _ (underscore), which may be followed by any number of these characters or digits; it may not be a C++ keyword.

Using meaningful identifiers (variables) that suggest what they represent makes programs easier to read and understand.

C++ is case sensitive. For example the compiler treats the variable `myVar` as a different identifier from the variable `MyVar`.

Any name in a program that is not a C++ keyword is an identifier and must be declared before it can be used.

The `const` modifier is used to declare constants, which are values that cannot be changed during program execution.

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Using named constants instead of the literals they represent improves code readability and facilitates program maintenance.

Placing constant declarations at the beginning of the class or method in which they are used is good programming practice because it makes it easy to locate them when modifications are necessary.

If an initial value is not specified in a variable declaration, its value is undefined (or indeterminate).

The format of a class is:

```
class ClassName
{
  public:
  ... declarations of operations
  private:
  ... declarations of attributes
}
```

A class declaration can be used to "wrap" multiple attributes of an object within a single structure;

A class declaration creates a new type. (Objects of that type will have space to store these attributes.)

Class declarations are usually placed in a header file of the form `ClassName.h`. Using a compiler directive of the form `#include "ClassName.h"` makes it possible thereafter in the program to declare objects of type `ClassName`.