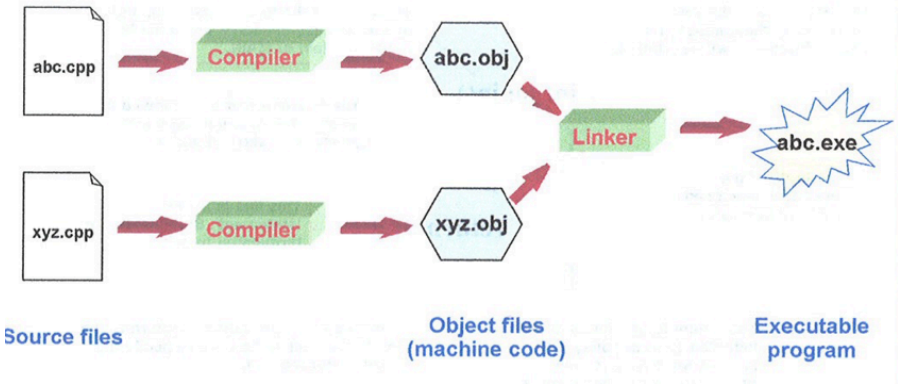
Hello, C++

What is C++

- A general purpose programming language
- Originally based on C
- Supports multiple programming paradigms
  - procedural
  - object oriented
  - generic
  - functional
- Developed and implemented by Bjarne Stroustrup

Writing, Building, Running a C++ Program

- C++ Programs normally consist of a number of "modules", which are individually compiled and then linked to form an executable program



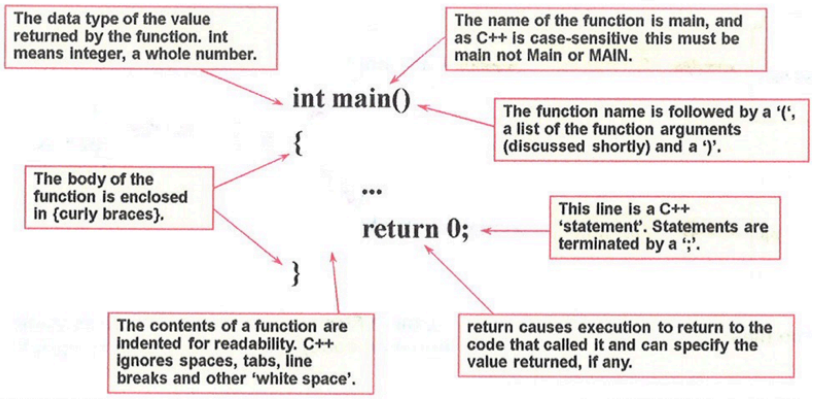
Inside main

- When a C++ program is run, the operating system uses the function main() as an entry point

```
#include <iostream>
using namespace std;
int main()
{
        cout << "Hello C++\n";
        return 0;
}
```

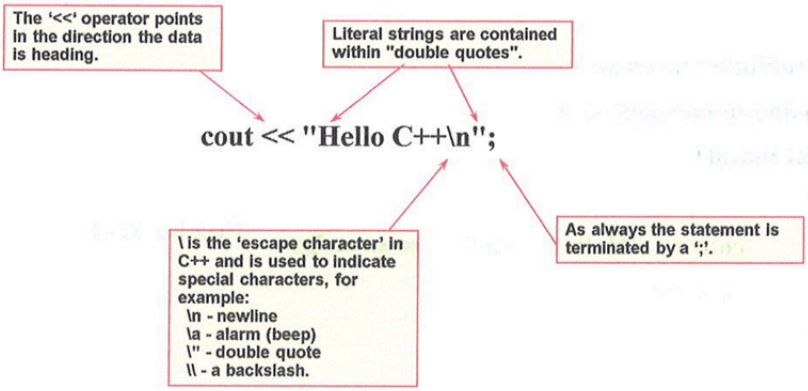
Inside main()

- The main() function is called by the system runtime
  - Should return – to indicate successful completion



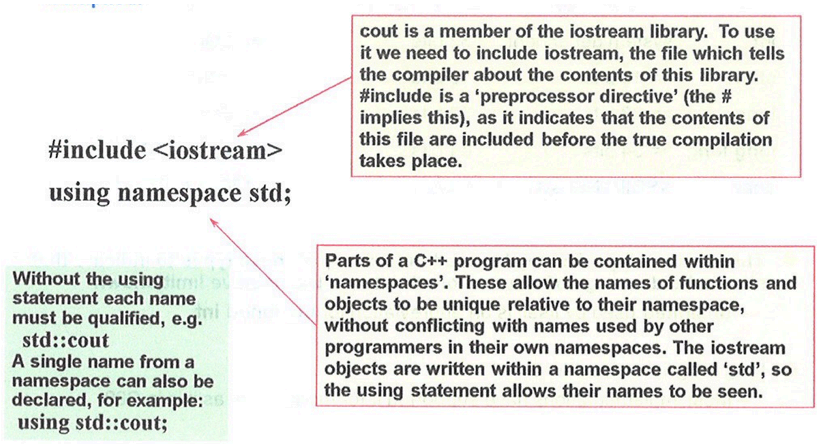
Console Output

- Standard output is represented by the C++ object cout
  - The << operator is used to send data to cout



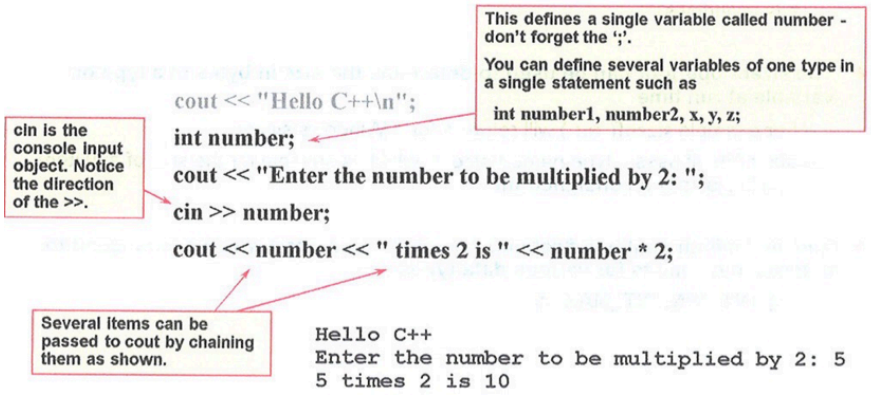
Housekeeping

- Some additional code is required to allow compilation to succeed



Variables

- Named memory locations
  - Associated with a type, must be declared with their type



Basic Integer Types

Name	Defined size	Windows size	Range of values
int	system dependent	32 bits	+/- 2Gi
short	>= 16 bits	16 bits	+/- 32Ki
long	>= 32 bits	32 bits	+/- 2Gi
long long	>= 64 bits	64 bits	+/- approx 10^{19}
char	ASCII/ANSI symbol	8 bits	-128 to +127

- Use unsigned prefix to cause range of values to start at 0
  - No negative numbers
- long long standardised in C++11
  - Available in other earlier versions though

About Types

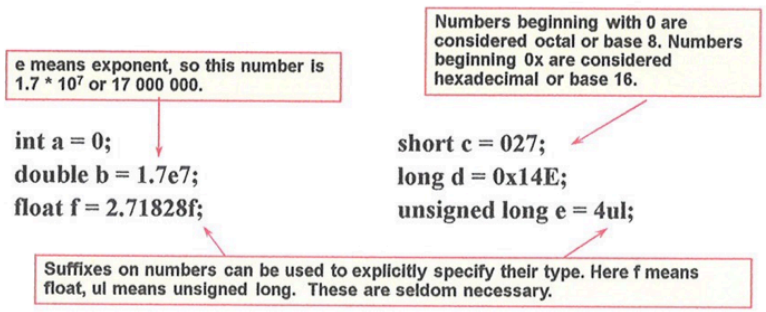
- C++ allows size and capacity of types to be discovered
  - Aids portability
- Sizeof operator yields the size in bytes of a given type or variable
  - E.g. sizeof(int)
  - Returns value of type size_t, typically a synonym for unsigned int
- Min and Max values for types can be discovered in file limits.h
  - Discussed later

Other Fundamental Data Types

- bool represents true/false
  - Supported by keywoards trie and false
  - Equivalent to 1 and 0
- Floating point types
  - float
  - double
  - long double
- wchar_t is 16 bit char type
  - For Unicode

Declaring and Initialising Variables

- Variables must be declared before use
  - May be declared at any point
- Initialisation is allowed at declaration
  - Otherwise initial value is determined by other factors (see later)



Strings

- Strings may be represented in different ways
  - Chararacter arrays: "C Style Strings"
  - Standard library string class

```
#include <iostream>
#include <string>
using namespace std;
int main()
{
        string s;
        cout << "What is your name: ";
        cin >> s;
        cout << "Hello " << s << "\n";
        return 0;
}
```

To use string the file which defines it must be included. Such files are known as 'header files'.

cin >> can be used to read in a string, but input is terminated by any white space character such as a space or enter.

```
What is your name: Arthur
Hello Arthur
```