

INTRODUCTION TO THE C LANGUAGE

B.Arnold 9/5/2008

In computing, C is a general-purpose, block structured, procedural, imperative computer programming language... Although C was designed for implementing system software, it is also widely used for developing application software. It is widely used on a great many different software platforms and computer architectures, C has greatly influenced many other popular programming languages, most notably C++, which originally began as an extension to C.

[en.wikipedia.org/wiki/C_\(programming_language\)](http://en.wikipedia.org/wiki/C_(programming_language))

ALL OF THOSE ASSORTED NAMES: C, C++, C#, MFC, C-SHARP, C-.NET, ETC.

C	Original language created by Kernighan and Ritchie Buy their book “The C Programming Language”, 2 nd edition.
C++	Advanced version of C created by Bjarne Stroustrup. Now includes OOP. Object Oriented Programming and Classes.
C# C-sharp MFC C-.net	Microsoft specific versions of C++ which deviate from accepted international standards such as ISO/IEC.
GCC	GNU Compiler Collection for Linux

SHORT HISTORY OF THE LANGUAGE.

Check Wikipedia about Kernighan and Ritchie and Bell Labs. It was developed on DEC computers to be very close to machine language (1978). The code that was produced rivaled code created directly in machine code or “assembler”. The language was so popular that others ported it to other processors such as 8080 and Z80 using CP/M.

REASONS FOR PROGRAMMING IN C AS OPPOSED TO OTHER LANGUAGES.

Speed of Execution: Code and applications are high in speed and low in overhead and size. This language can be used for “Disk Based” as well as “Embedded” applications.

REASONS FOR NOT PROGRAMMING IN C AS OPPOSED TO OTHER LANGUAGES.

The language is harder to learn than others such as Java or Basic
“Speed of execution” comes from “less error checking”.

COMPUTER SYSTEMS THAT USE C BASED APPLICATIONS.

Virtually all home, business, and game computers have operating system and application programs written in C or C++.

AVAILABLE TOOLS OR "COMPILERS".

Microsoft	Express C++ and C# (Free) Visual Studio (\$\$)
Linux	GNU and GCC (Free)
Borland	C++ Builder (\$\$)
Intel	C++ (free trial)
Apple	Macintosh Programmer's Workshop (MPW)
iPhone	Xcode and Objective-C 2.0.

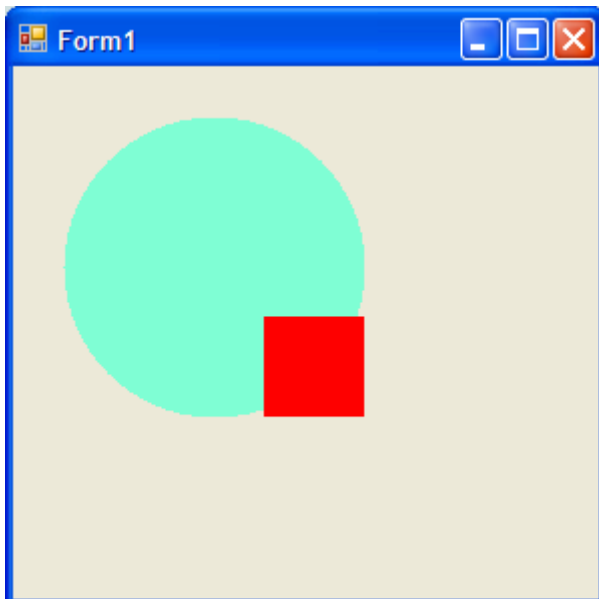
SAMPLE PROGRAM ONE (Any C or C++ compiler)

```
#include <stdio.h>
main()
{
    printf ("Hello World!\n");
    return 0;
}
```

SAMPLE PROGRAM TWO (Microsoft Visual Studio)

```
using namespace System::Drawing;

private: System::Void Form1_Paint(System::Object^ sender,
    System::Windows::Forms::PaintEventArgs^ e)
{
    Graphics ^g = e->Graphics;
    SolidBrush^ mBrush1 = gcnew SolidBrush(Color::Aquamarine);
    SolidBrush^ mBrush2 = gcnew SolidBrush(Color::Red);
    g->FillEllipse(mBrush1,25,25,150,150);
    g->FillRectangle(mBrush2,125,125,50,50);
}
```



SAMPLE PROGRAM THREE (Any C++ compiler)

```
// Pi.cpp      ---      Calculate Pi
//
// pi = 4x(1 -1/3 +1/5 -1/7 +1/9 -1/11 +1/13 ...);

#include "stdafx.h"
#include <iostream.h>
#include <math.h>

int main()
{
    double pi = 0;           // Calculating pi/4
    int elements = 50000;
    for (long int n = 1; n <= elements; n++)
    {
        pi += (double) pow(-1, n+1) / (2*n-1);
    }
    // Calculating pi
    pi *= 4;
    cout << endl << "Estimated PI value (" << elements << " elements): " << pi << endl;
    return 0;
}
```

Notes:

- A “double” is typically a 15 digit floating point number less than 1.8 e+308.
- Both “int” and “long int” are typically a 10 digit numbers less than 2,100,000,000.
- Use “stdio.h” and “printf” instead of “iostream.h” and “cout” for ‘C’ compilers.

Resulting Output:

Estimated PI value (50000 elements): 3.14157

FURTHER READING AND WEB SITES

www.thefreecountry.com/compilers/cpp.shtml	Dozens of compilers
www.cprogramming.com	Excellent starting point
www.codeproject.com	Lots of Code Samples
www.catch22.net	Free software, sourcecode and tutorials
www.tenouk.com	Many tutorials on Microsoft C
www.linfo.org/create_c1.html	Linux C for beginners (note: there is an underscore in “create_c1”.)
www.linuxselfhelp.com/HOWTO/C++Programming-HOWTO.html	The link says it all.
www.openmotif.org	Motif creates X-Windows Linux Programs
freeglut.sourceforge.net	OpenGL X-Windows Linux Ubuntu
www.ddj.com	Dr. Dobb's Journal – Sophisticated topics
www.codeguru.com	More sophisticated topics
www.c-stamp.com	\$44 Microcontroller for robotics