Software Design and Development

10 Languages *Language - the tool of thinking.*

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We look at two different programming languages - VB and C - and decide which one is better for beginner programmers.

10.1 Beginner Programmers

Students learning programming for the first time need to learn a programming language. They need to learn how to write computer programs. And they need to learn how to use a program development environment.

Students need a programming language that is

- small - not a lot to learn
- simple - easy to read and understand, focuses on fundamental concepts
- transferable - easy to transfer skills learned to other programming languages

They need to write many small programs to develop computer programming skills.

And they need a program development environment that is:

- small - quick to load and run, with minimal dependencies on other files
- simple - just the minimum of facilities with a pleasant interface
- free - students are not rich

You do not want to overwhelm the beginning student with complexities. Learning how to solve programming problems is complex enough.

We look at two languages - C and Visual Basic.

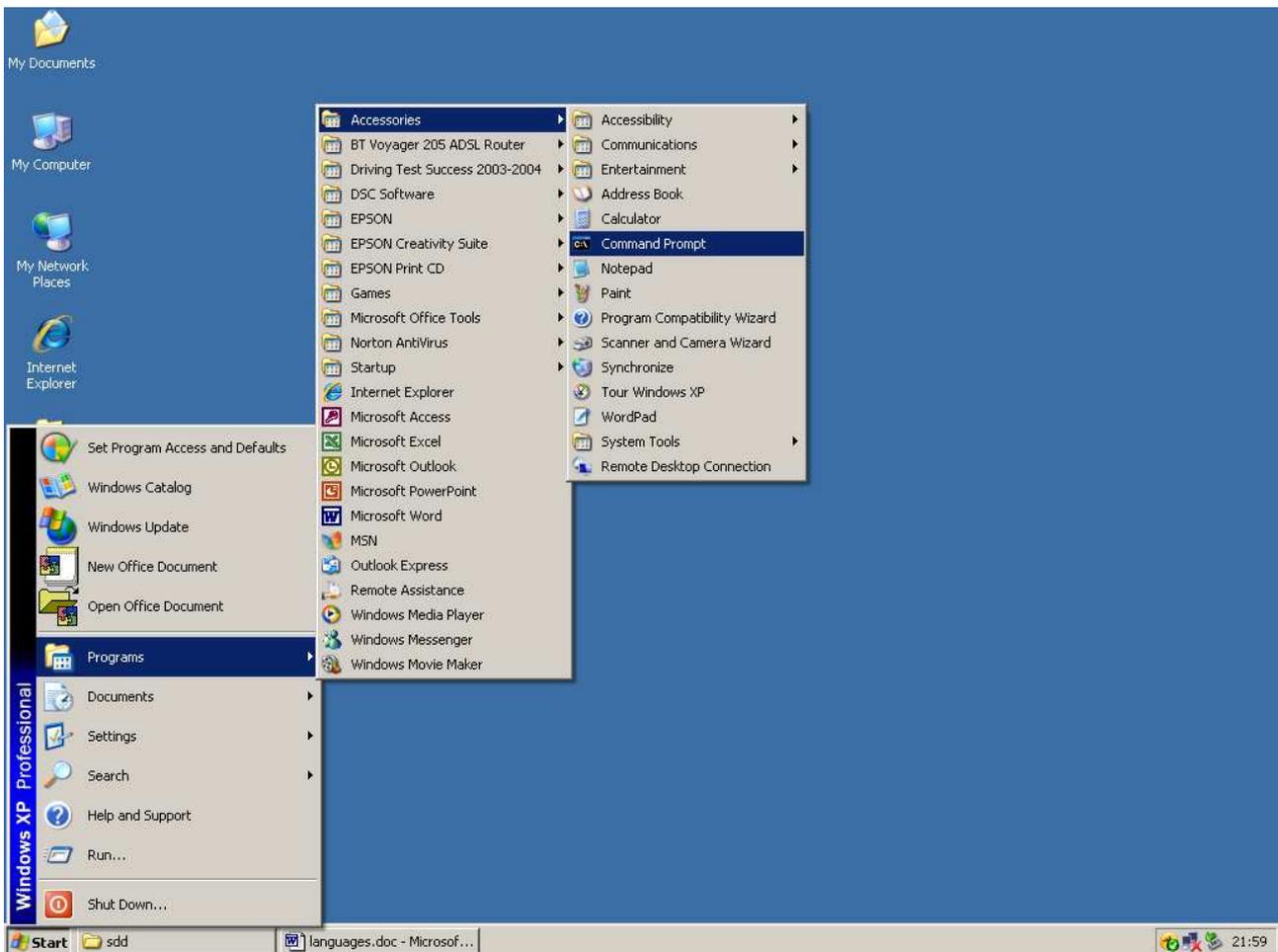## 10.2 C and Visual Basic

C was devised by Dennis Ritchie in the 1970's for writing the UNIX computer operating system and most of the programs associated with it. Since then it has been used widely for a variety of applications, such as in engineering, accounting and computing. It is the language loved by older programmers because it gives them complete control - they have to write most of the coding, line by line. For example, it takes about 25 lines of coding just to display a simple text box.

Visual Basic is derived from BASIC. BASIC was devised by John Kemeny and Thomas Kurtz in the 1960's for teaching beginners how to write programs. In the 1990's Microsoft extended BASIC by adding support for Windows programming. Visual Basic is the language loved by younger programmers because so much is achieved by doing so little - you can drag and drop windows components - labels, text boxes, buttons - and the coding for these is written automatically by the program development environment.

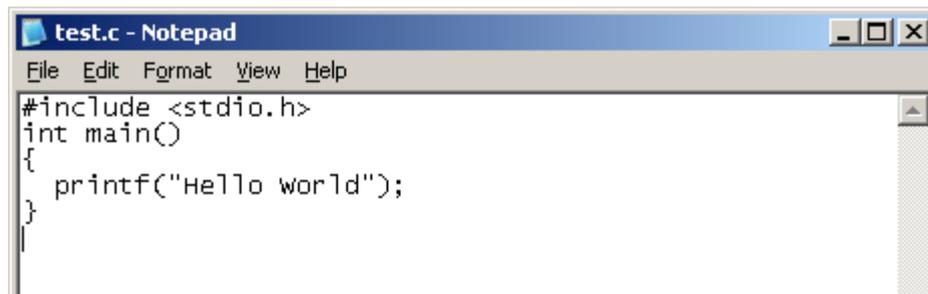|	Feature	Visual Basic	ANSI C	Comment
1	Size	Huge - at least 137 keywords - If, Then, Else, ElseIf, While, Do, Repeat, For Each, For Next ...	Small, just 32 keywords - if, else, while, for ...	VB provides many different ways of completing the same task e.g. over 10 different ways of writing a loop, C has just 3.
2	Simplicity	Forced to use GUI components such as labels, text boxes and buttons	No need to use GUI components (but if you want them you have to write them yourself).	C allows you to focus on just the programming fundamentals and to ignore the complexities of GUIs.
3	Transferability	Harder to switch to C after learning VB - so much to unlearn	Easier to switch to VB after learning C	This is a matter of opinion - some may not agree.
4	Declarations	Dim intNum As Integer = 0	int intNum = 0;	VB is wordy. C is concise - short and to the point.

5	While loops	Dim intNum As Integer = 0
		While intNum < 3 Do
		
		   ...
		   intNum = intNum + 1
		End While
			int intNum = 0;
			while (intNum < 3) {
			
			   ...
			  intNum++;
			}
				{ means begin and } means end. intNum++ means add 1 to intNum.

6	Functions	Function add(ByVal num1 As Integer, ByVal num2 As Integer) As Integer
		   Dim intResult As Integer =
		      num1 + num2
		   Return intResult
		End Function
			int add(int num1, int num2)
			{
			  int intResult = num1 + num2;
			  return intResult;
			}
				A C program is a collection of functions. A VB program is a collection of functions and procedures. A procedure does not return a value - this is the essentail difference between a function and a procedure.

7	Output	txtOutput.Text = intNum.ToString()	printf("%d", intNum);	VB has more words, but they are easy to read and understand. C has peculiar words and and takes some getting used to.

8	Input	Dim intNum As Integer = Convert.ToInt32(txtInput.Text)	char[25] string;
			int intNum = 0;
			gets(string);
			intNum = atoi(string);
				txtInput is a VB text box. gets() reads the text input at the keyboard. atoi() converts the text to an integer.

The Visual Basic program development environment is large and complex and contains features not used by beginners in programming - check out the Hello World handout. Its complexities also mean that copying program files to a different directory can sometimes result in lost links with the program development environment, resulting in programs that worked yesterday, but not today. This is very frustrating for beginner programmers. However, the program development environment can point out some errors as you type, and the system also provides useful and helpful prompts when you are typing VB code.

The simplest C programming environment is MS-DOS - the Microsoft Disk Operating System. It is a command line interface, reached (in Windows) by:
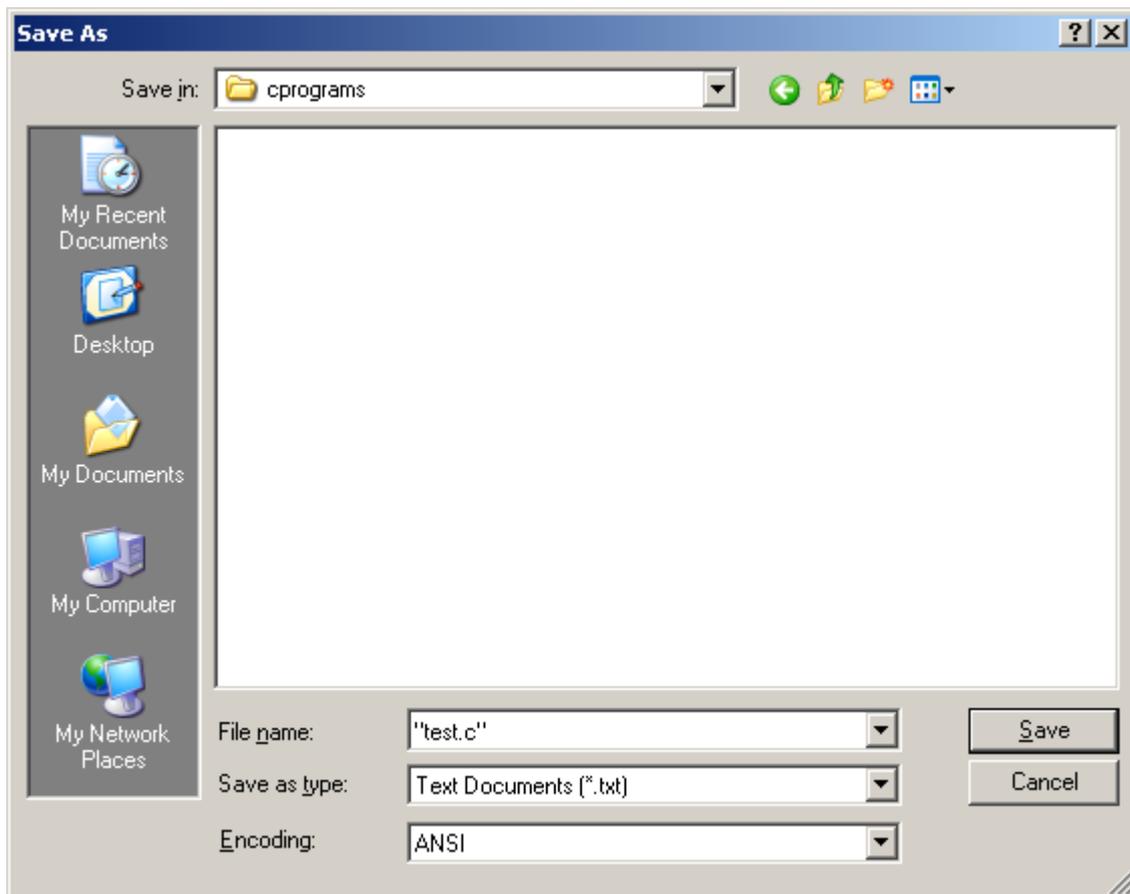

Open two windows, one for MS-DOS and one for Windows Notepad.

Type your test program into Notepad.

```
test.c - Notepad
File  Edit  Format  View  Help
#include <stdio.h>
int main()
{
  printf("Hello world");
}
```

Save your test program in your chosen directory. Remember to include quotes around your file name.
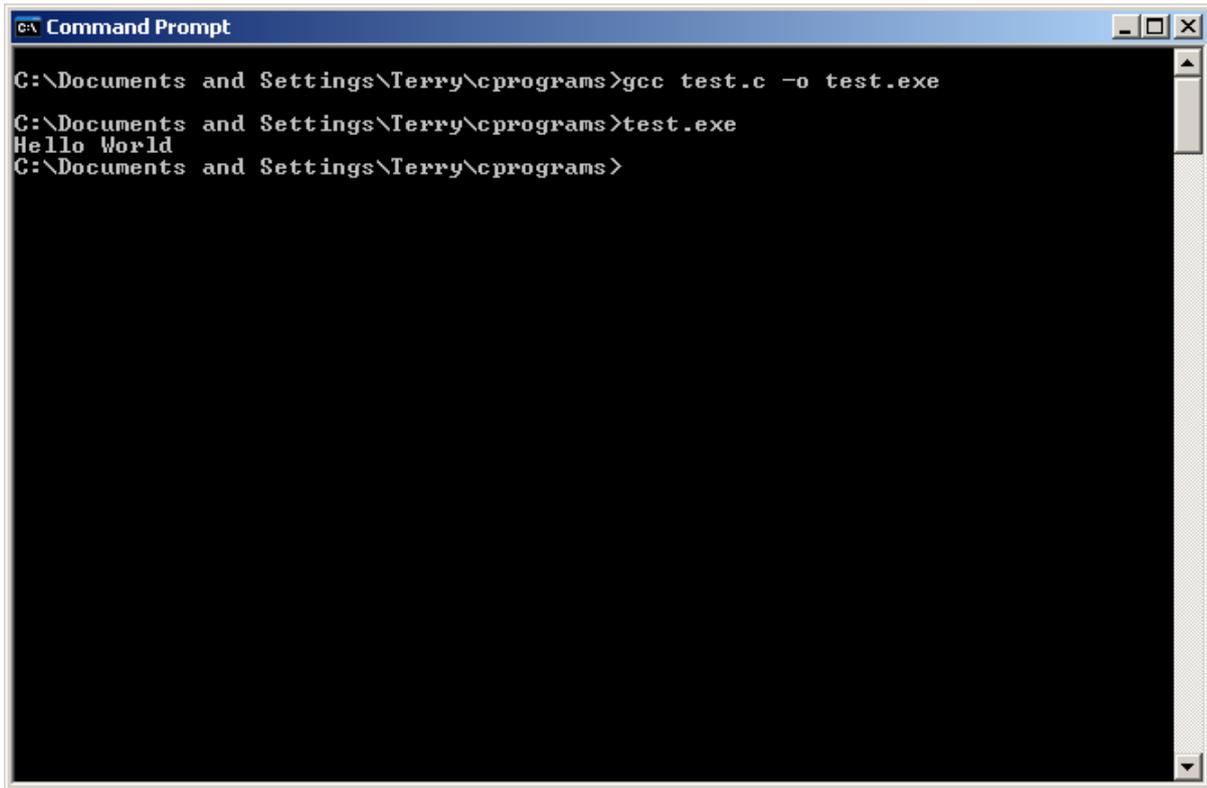

In your MS-DOS window compile your program with

```
gcc test.c -o test.exe
```

Run your program with

```
test.exe
```

```
Command Prompt                                              _ |□| x|

C:\Documents and Settings\Terry\cprograms>gcc test.c -o test.exe

C:\Documents and Settings\Terry\cprograms>test.exe
Hello World
C:\Documents and Settings\Terry\cprograms>
```

But the world of MS-DOS is a strange one to modern students brought up on Windows, mice and pointers. You will have to learn how to use MS-DOS commands such as:

- dir - to list the contents of a directory or filder
- mkdir - to creare a new directory or folder
- copy - to copy a file from one location to another

You can get Windows based C++ program development environments free. Dev-C++ is an example. It can be obtained from *http://sourceforge.net/projects/dev-cpp/*. It is nearly as complex as the VB environment. You can use a C++ development environment to create C programs because C++ is C plus a lot more.

Instructions on using the Dev-C++ programming environment may be found at

http://cs.armstrong.edu/liang/cpp/supplement/supplement2cDevCppTutorial.pdf

Tutorials on the C programming language may be found at

http://www.eskimo.com/~scs/cclass/notes/top.html

C is a bit like marmite: you either hate it or you love it.

10.3 C or Visual Basic

The best programming language for beginners is ...... *you decide* .... because ...... *you tell me* ......

Bibliography

http://sourceforge.net/projects/dev-cpp/ accessed April 2009. A C++ program development environment.

http://cs.armstrong.edu/liang/cpp/supplement/supplement2cDevCppTutorial.pdf accessed April 2009. Tutorial on how to use the Dev-C++ environment.

http://www.eskimo.com/~scs/cclass/notes/top.html Accessed April 2009. Tutorials on the C programming language.