Introducing C#

The introduction of the Microsoft .NET framework at the Professional Developers Conference in July 2000 also saw Microsoft introduce a new programming language called C# (pronounced "see-sharp"). The name was inspired by musical notation where a # sharp symbol indicates that a written note should be a semitone higher in pitch. This notion is similar to the naming of the C++ programming language where the ++ symbol indicates that a written value should be incremented by 1.

- C# is designed to be a simple, modern, general-purpose, object-oriented programming language, borrowing key concepts from several other languages – most notably the Java programming language. Consequently, everything in C# is a class "object" with "properties" and "methods" that can be employed by a program.
- C# is an elegant and "type-safe" programming language that enables developers to build a variety of secure and robust applications. You can use C# to create Windows client applications, XML web services, distributed components, client-server applications, database applications, and much, much more.
- C# is specifically designed to utilize the proven functionality built into the .NET framework "class libraries". Windows applications written in C# therefore require the Microsoft .NET framework to be installed on the computer running the application – typically, an integral component of the system.

Don't forget

The source code of all examples in this book is available for free download at www.ineasysteps.com/resource-center/downloads

Hot tip

If you don't achieve the result illustrated in any example, simply compare your code to that in the original example files you have downloaded to discover where you went wrong.

The Microsoft .NET Framework

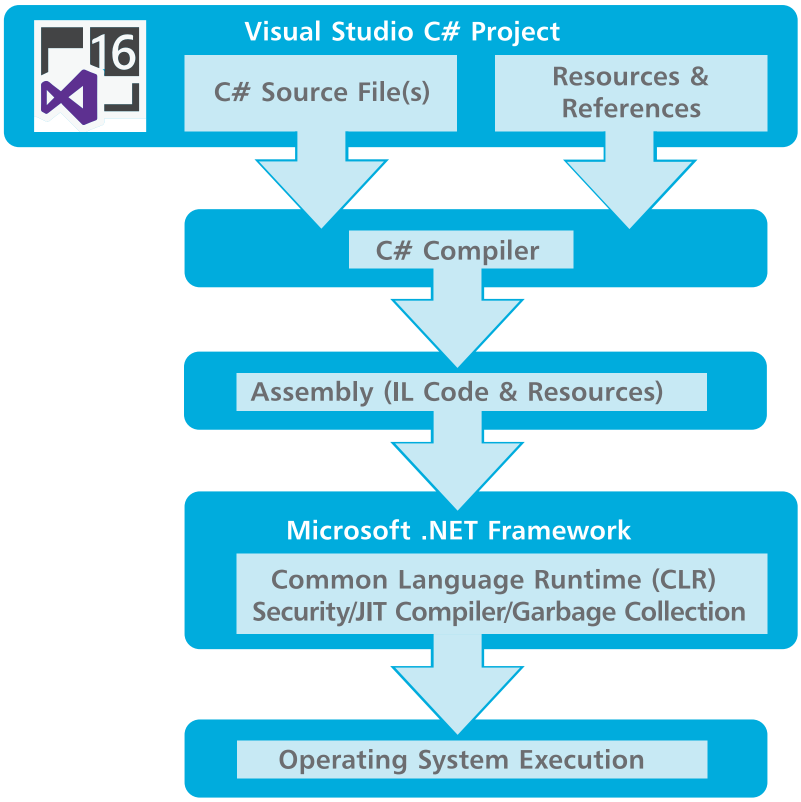
Each version of the Microsoft .NET framework includes a unified set of class libraries and a virtual execution system called the Common Language Runtime (CLR). The CLR allows the C# language and the class libraries to work together seamlessly.

To create an executable program, source code written in the C# language is compiled by the C# Compiler into Intermediate Language (IL) code. This is stored on disk, together with other program resources such as images, in an "assembly". Typically, the assembly will have a file extension of .exe or .dll. Each assembly contains a "manifest" that provides information about that program's security requirements.

When a C# program is executed, the assembly is loaded into the Common Language Runtime (CLR), and the security requirements specified in its assembly manifest are examined. When the security requirements are satisfied, the CLR performs Just-In-Time (JIT) compilation of the IL code into native machine instructions. The CLR then performs "garbage collection", exception handling, and resource management tasks before calling upon the operating system to execute the program:

Hot tip

Just-In-Time compilation is also known as "Dynamic Translation".


Visual Studio C# Project
16
C# Source File(s)
Resources & References
C# Compiler
Assembly (IL Code & Resources)
Microsoft .NET Framework
Common Language Runtime (CLR)
Security/JIT Compiler/Garbage Collection
Operating System Execution

Don't forget

Just-In-Time compilation occurs during program execution, rather than prior to its execution.

As language interoperability is a key feature of the Microsoft .NET framework, the IL code generated by the C# Compiler can interact with code generated by the .NET versions of other languages such as Visual Basic and Visual C++. The examples throughout this book demonstrate Visual C# program code.