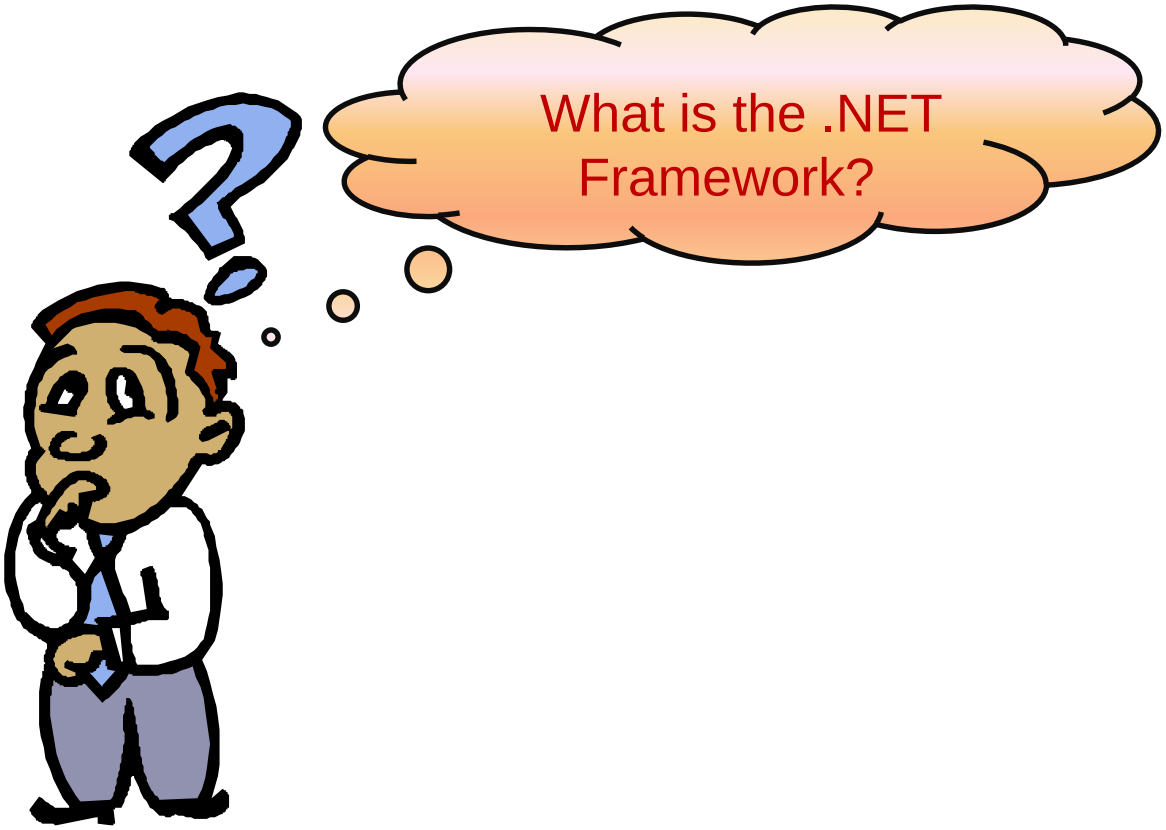
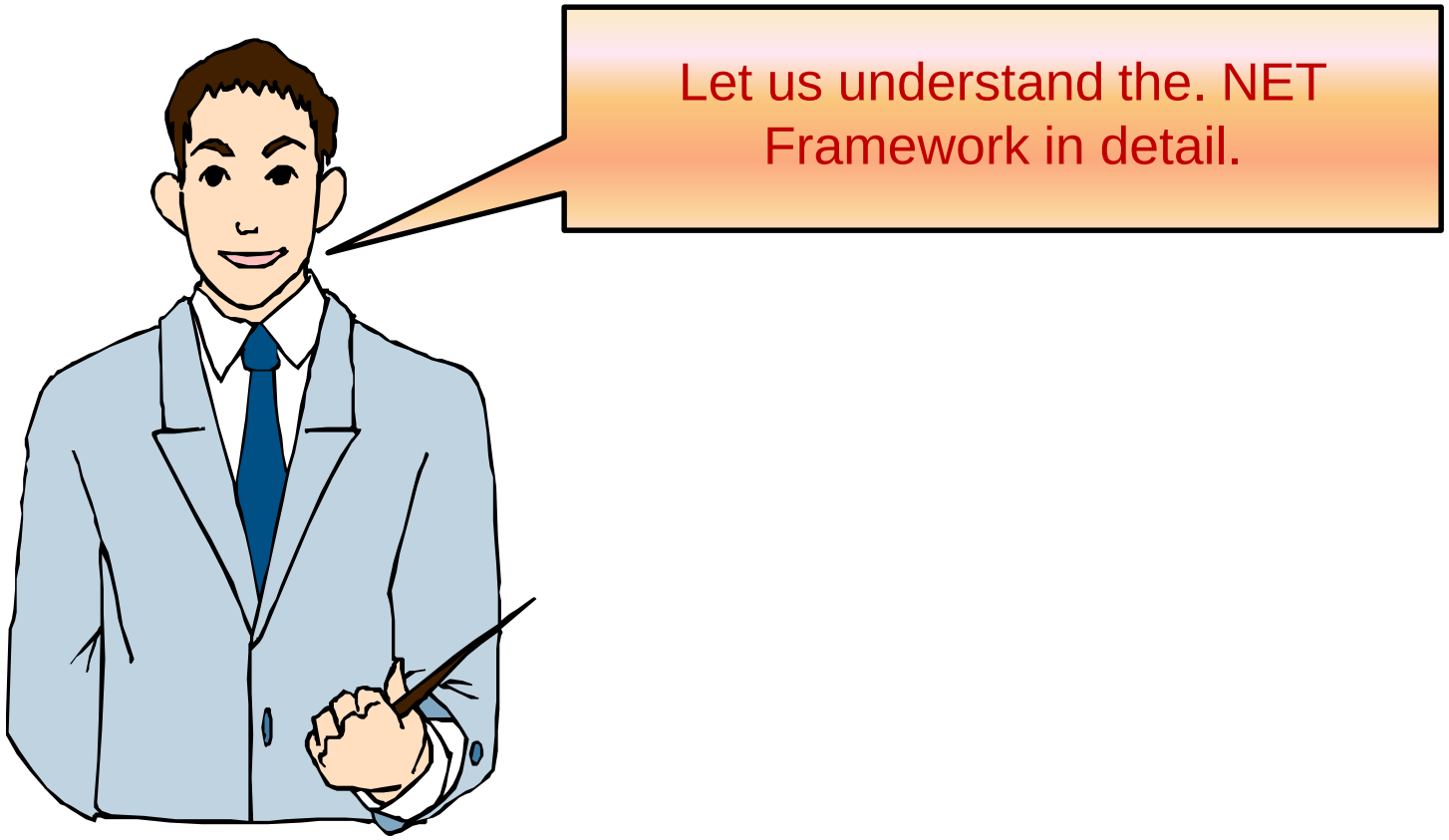
Objectives

- In this session, you will learn to:
  - Identify the components of the .NET Framework
  - Understand the Visual Studio .NET IDE

Identifying the Components of the .NET Framework



Identifying the Components of the .NET Framework (Contd.)



Identifying the Components of the .NET Framework (Contd.)

- Microsoft introduced the .NET Framework to make applications more interoperable.
- Interoperability of applications means the ability of applications, developed in different languages, to be able to work together and exchange information with each other.
- The objective of .NET framework is to bring various programming languages and services together.

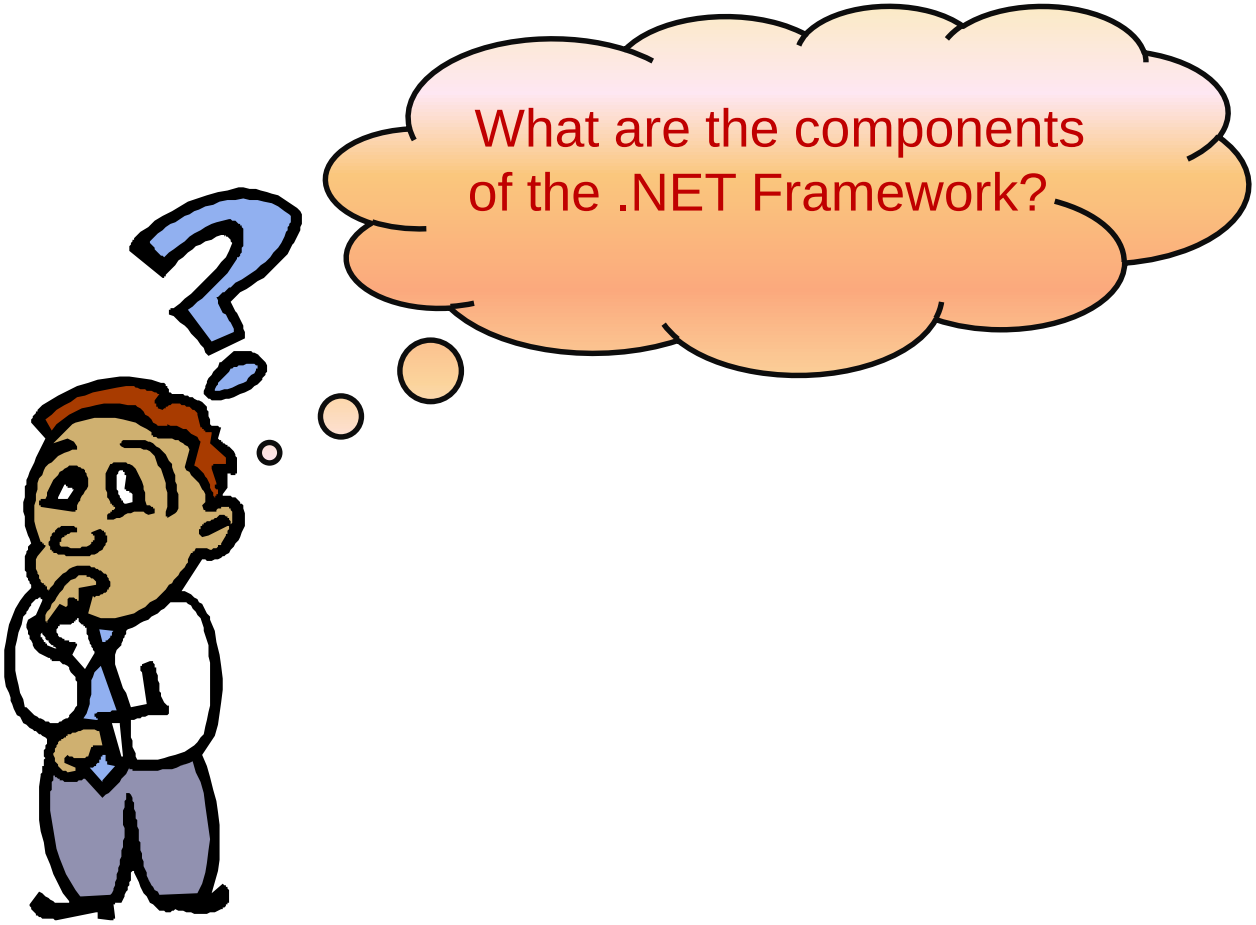
Identifying the Components of the .NET Framework (Contd.)

- The .NET Framework is designed to make significant improvements in:
  - Code reusability
  - Code specialization
  - Resource management
  - Multi-language development
  - Application security
  - Application deployment
  - Application administration

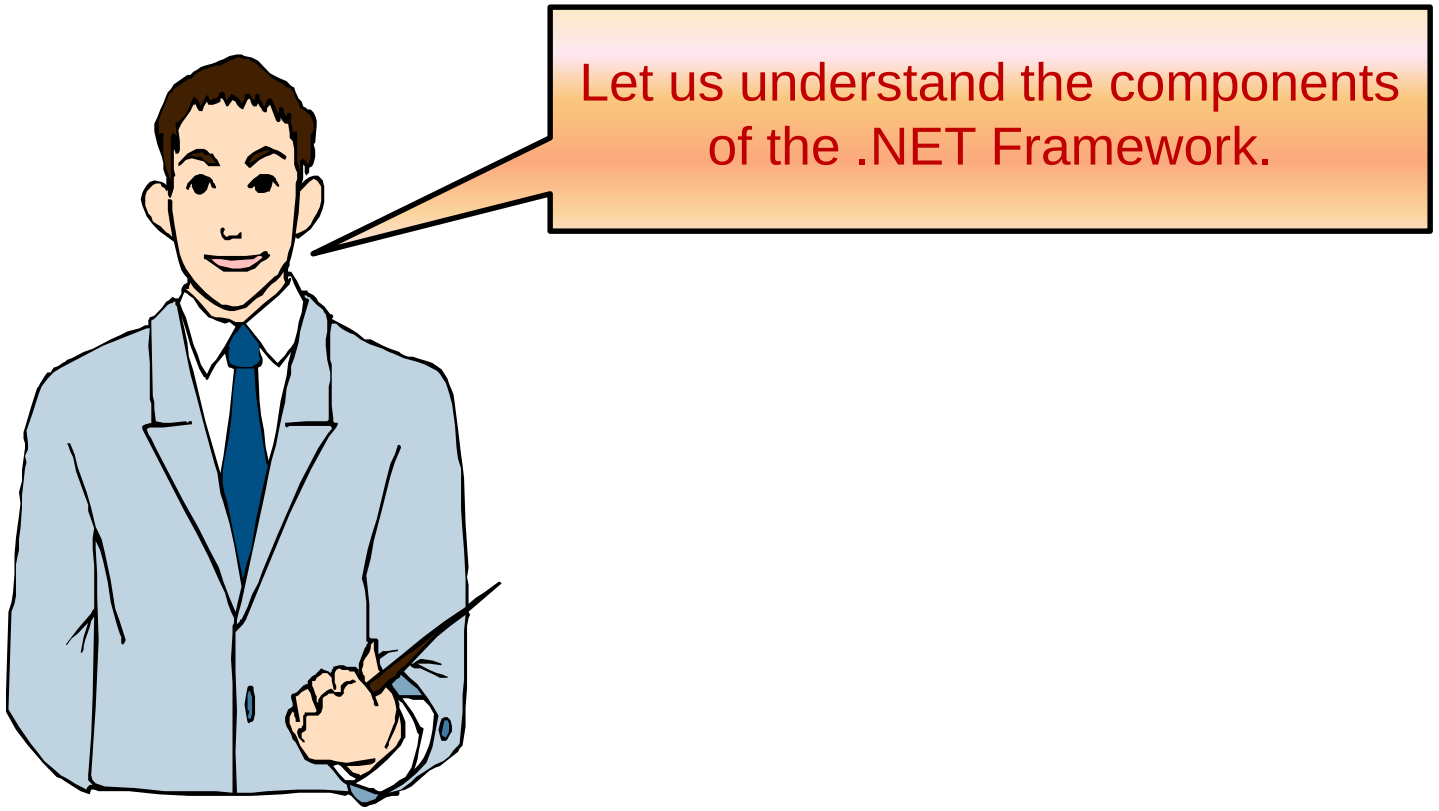
Identifying the Components of the .NET Framework (Contd.)

- The. NET Framework consists of all the technologies that help in creating and running applications that are:
  - Robust: Applications those are strong.
  - Scalable: Applications that can be extended.
  - Distributed: Applications that runs on computers of different networks.
- The .NET offers a complete suite for developing and deploying applications. This suite consists of:
  - .NET Products
  - .NET Services
  - .NET Framework

Components of the .NET Framework

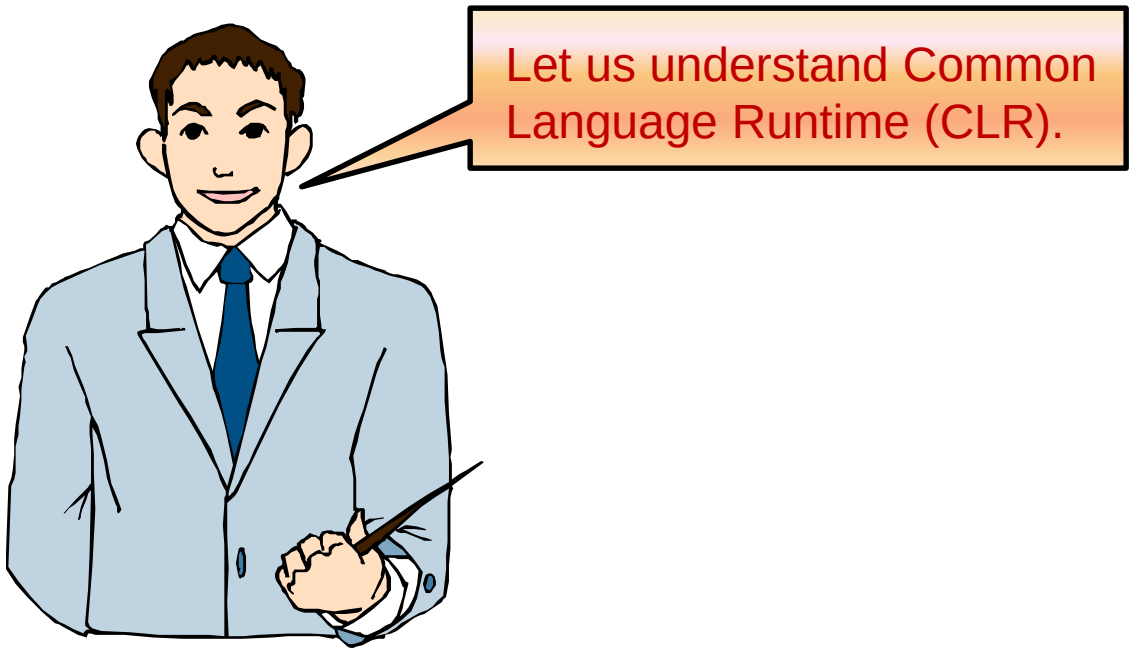


Components of the .NET Framework (Contd.)



Components of the .NET Framework (Contd.)

- The .NET Framework consists of the following components:
  - Common Language Runtime
  - .NET Framework Base Classes
  - User and program interfaces



Components of the .NET Framework (Contd.)

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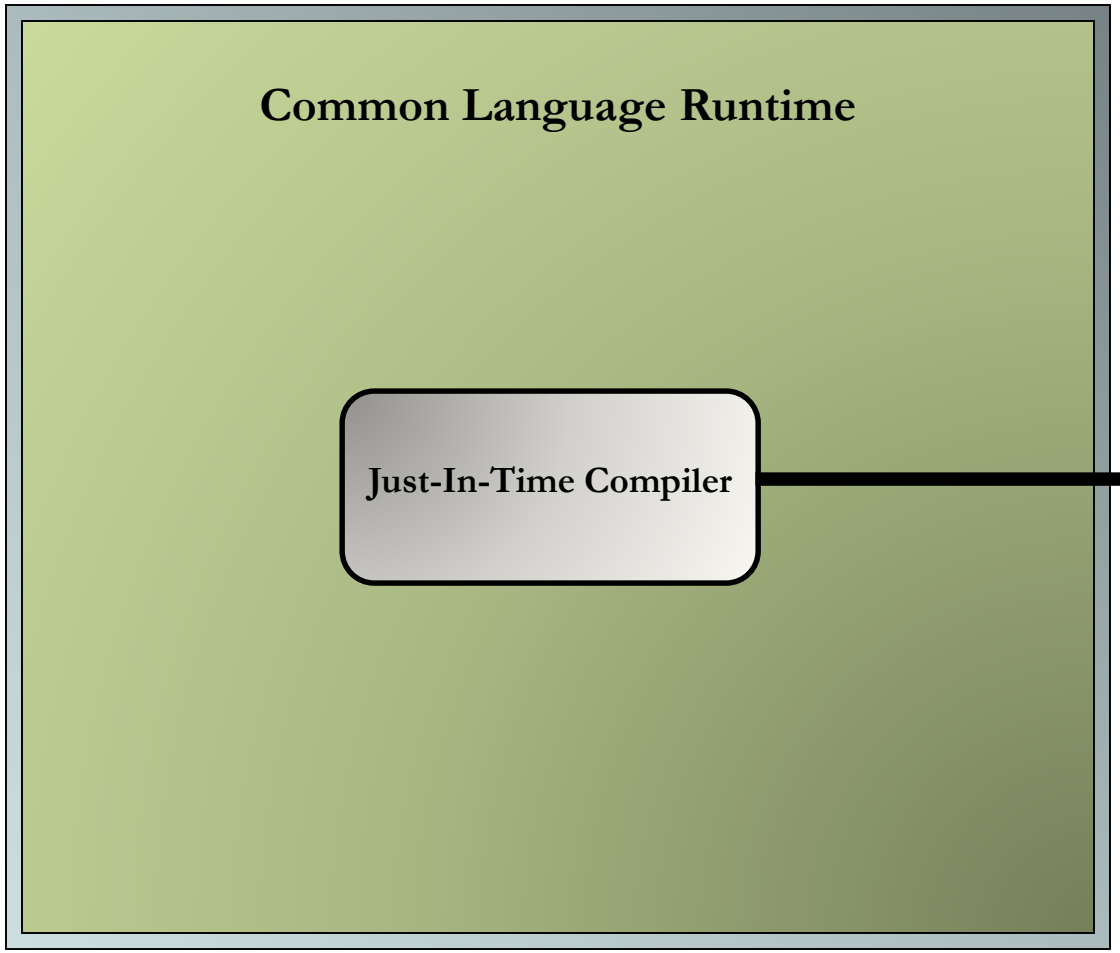
- Common Language Runtime (CLR):
  - Is the environment where all programs using .NET technologies are executed.
  - Provides services such as code compilation, memory allocation, and garbage collection.
  - Allows the execution of code across different platforms by translating code into Intermediate Language (IL).
- IL is a low level language that the CLR understands.
- IL is converted into machine language during execution by the Just-In-Time compiler.
- During JIT compilation, code is also checked for type safety.

Components of the .NET Framework (Contd.)



Low level language is converted into machine language by the Just-In-Time compiler

Components of the .NET Framework (Contd.)

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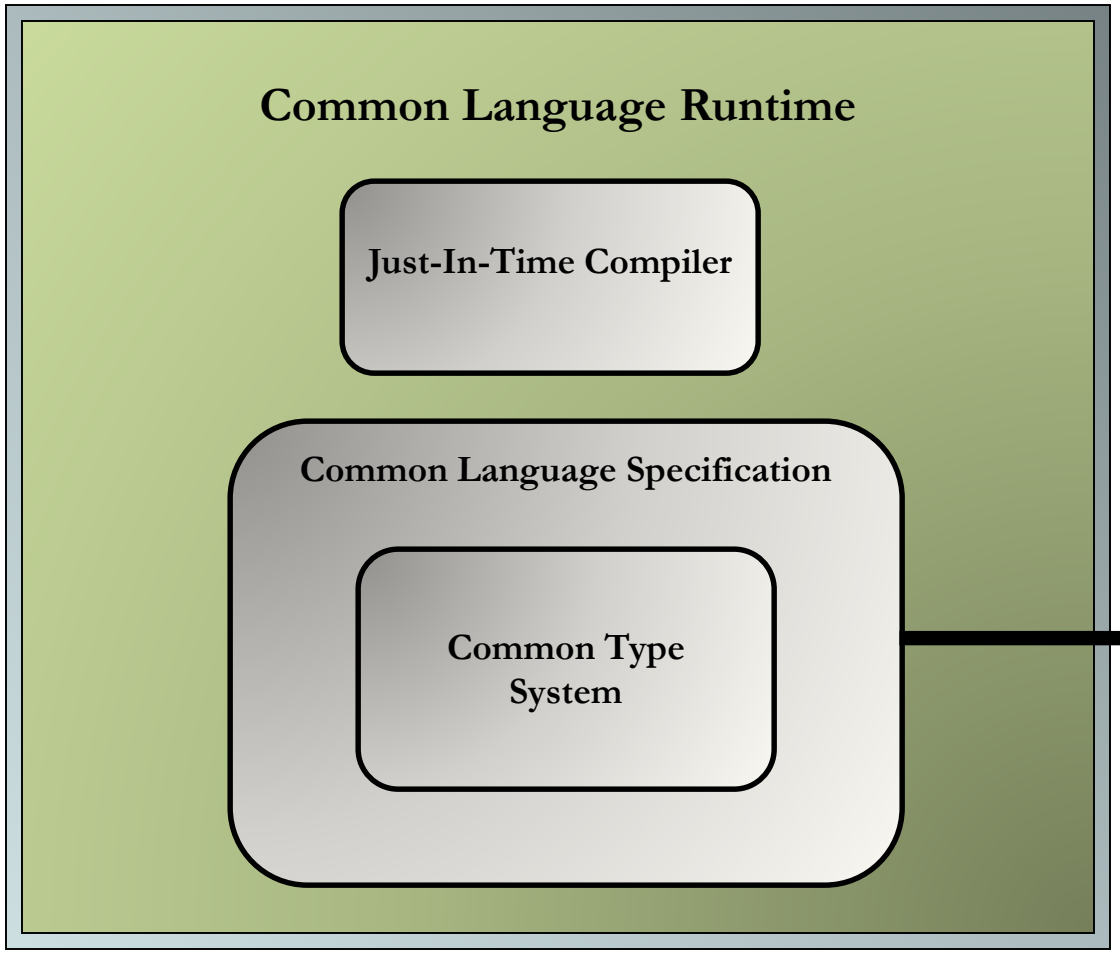
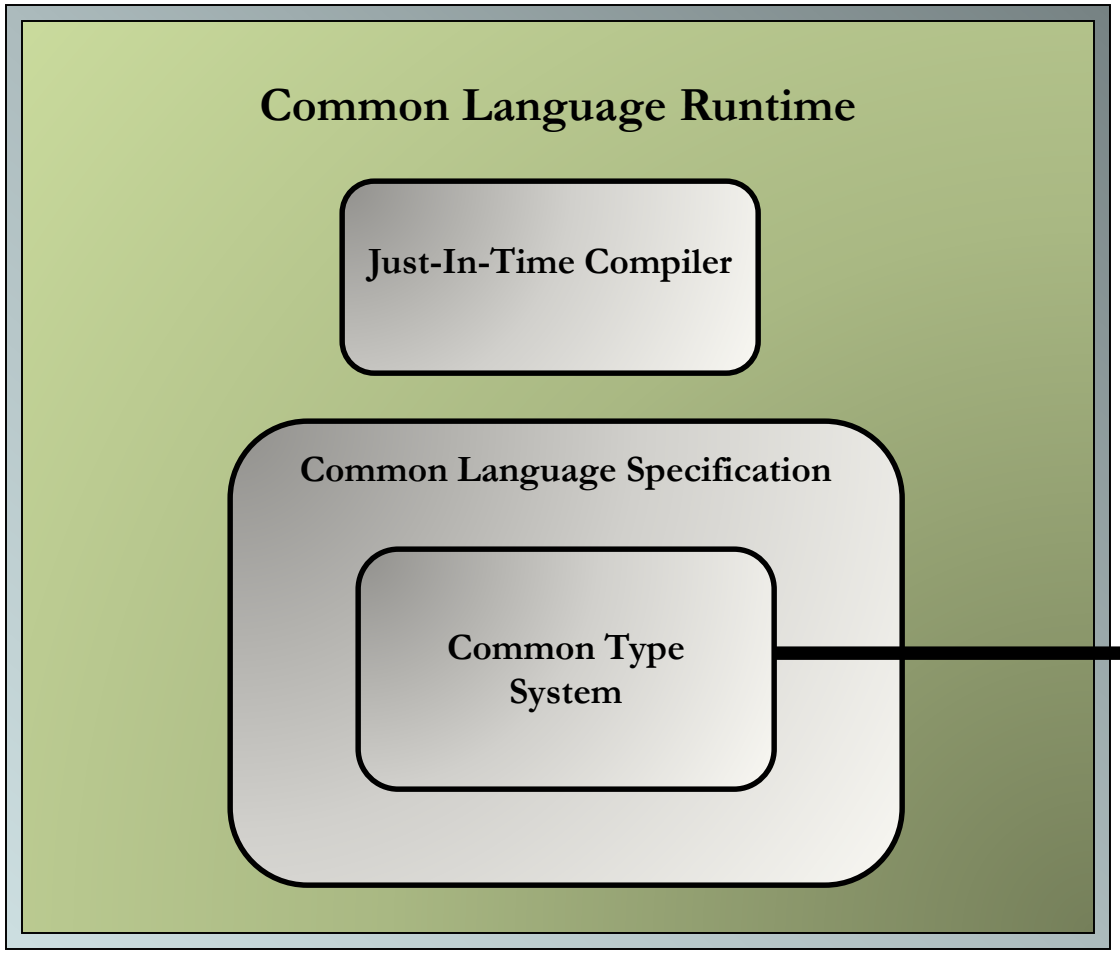
- CLR consists of a set of common rules followed by all the languages of the .NET Framework. This set of rules is known as Common Language Specification (CLS).
- CLS enables an object or application to interact with the objects or applications of other languages.
- One of the specifications defined in CLS is Common Type System (CTS), which provides a type system that is common across all languages.
- CTS defines how data types are declared, used, and managed in the code at run time.

Components of the .NET Framework (Contd.)



CLS enables an object or application to interact with the objects or applications of other languages.

Components of the .NET Framework (Contd.)



CTS defines how data types are declared, used, and managed in the code at run time.

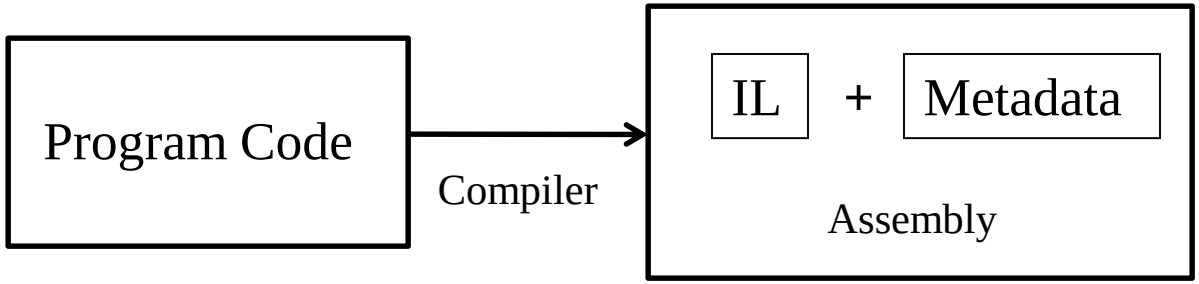
Components of the .NET Framework (Contd.)

AlmaMate

- Compilation is the process of creating an executable program from a source code.
- When you compile a program in .NET, the conversion of source code to machine language happens in two stages.
- In the first stage, the compiler translates code into an IL instead of machine language or assembly language.
- In the second stage the conversion of IL to machine language is done at run time by the JIT compiler.

Components of the .NET Framework (Contd.)

- The following figure shows the process of code compilation.

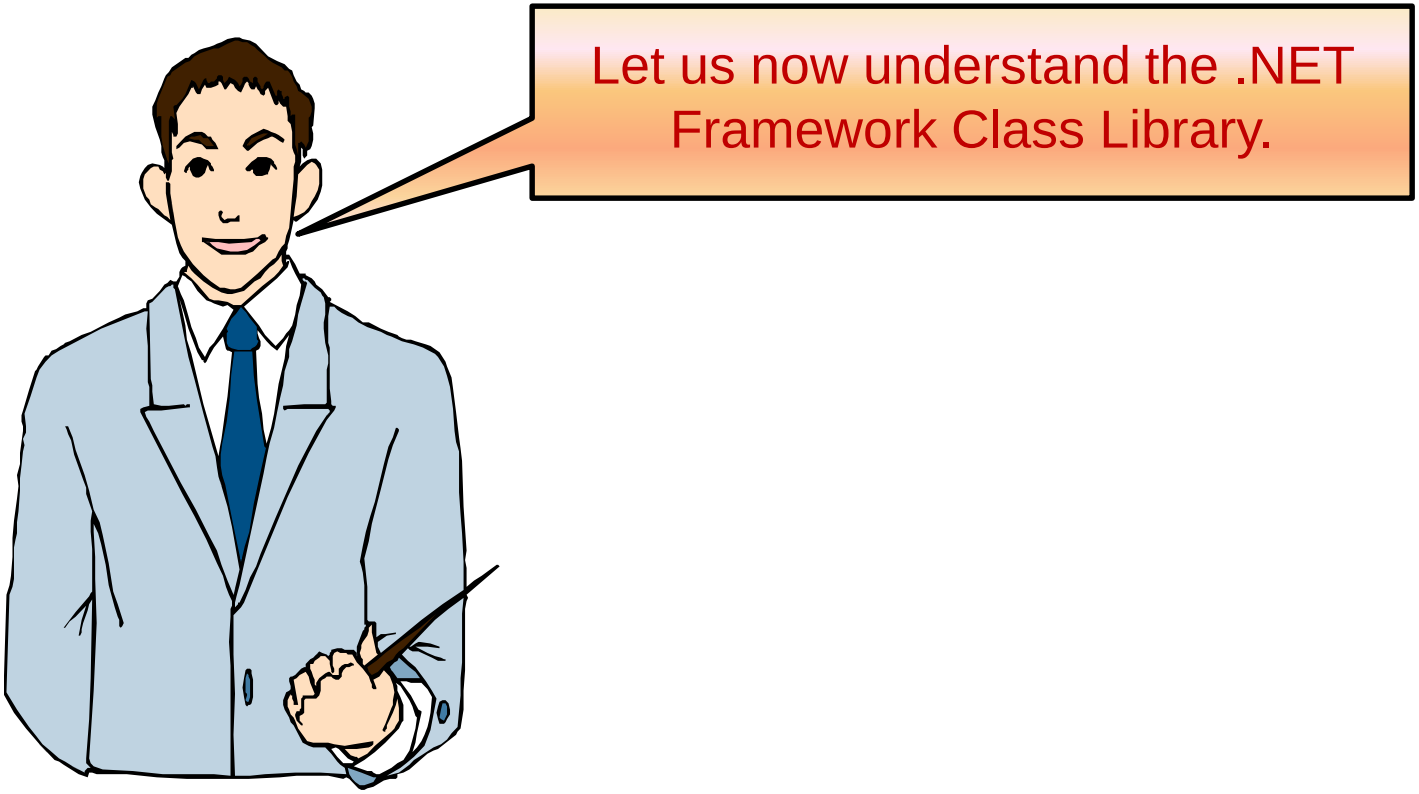


Components of the .NET Framework (Contd.)

AlmaMate

- During execution, CLR performs the following tasks:
  - Loading assemblies and identifying namespaces
  - JIT compilation
  - Garbage collection
- The code developed in .NET is called managed code.
- The CLR manages the compilation and execution of the managed code to ensure proper functioning of the code.
- An assembly contains IL and metadata that was generated during compilation.
- Instead of compiling the complete IL code, the JIT compiler compiles only the code that is required during execution.

Components of the .NET Framework (Contd.)



Components of the .NET Framework (Contd.)

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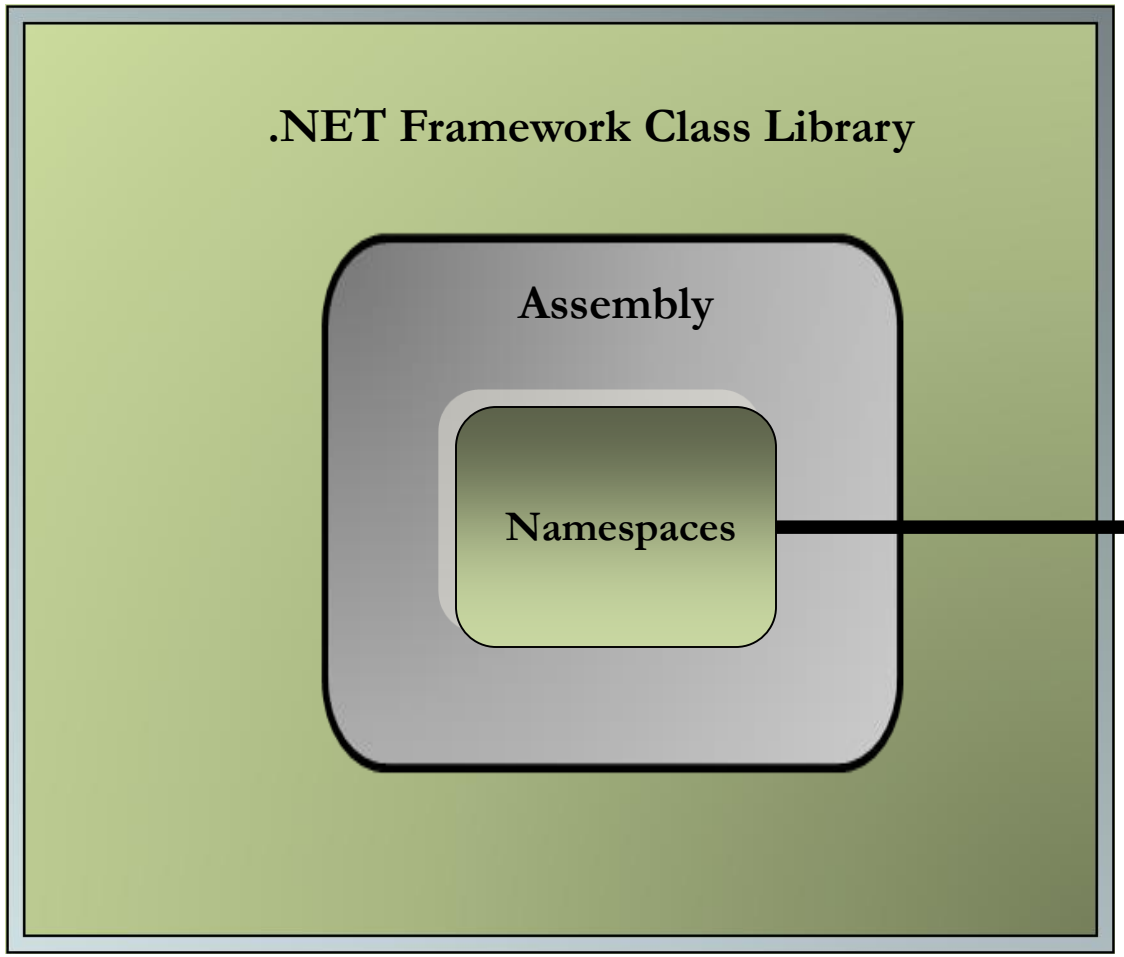
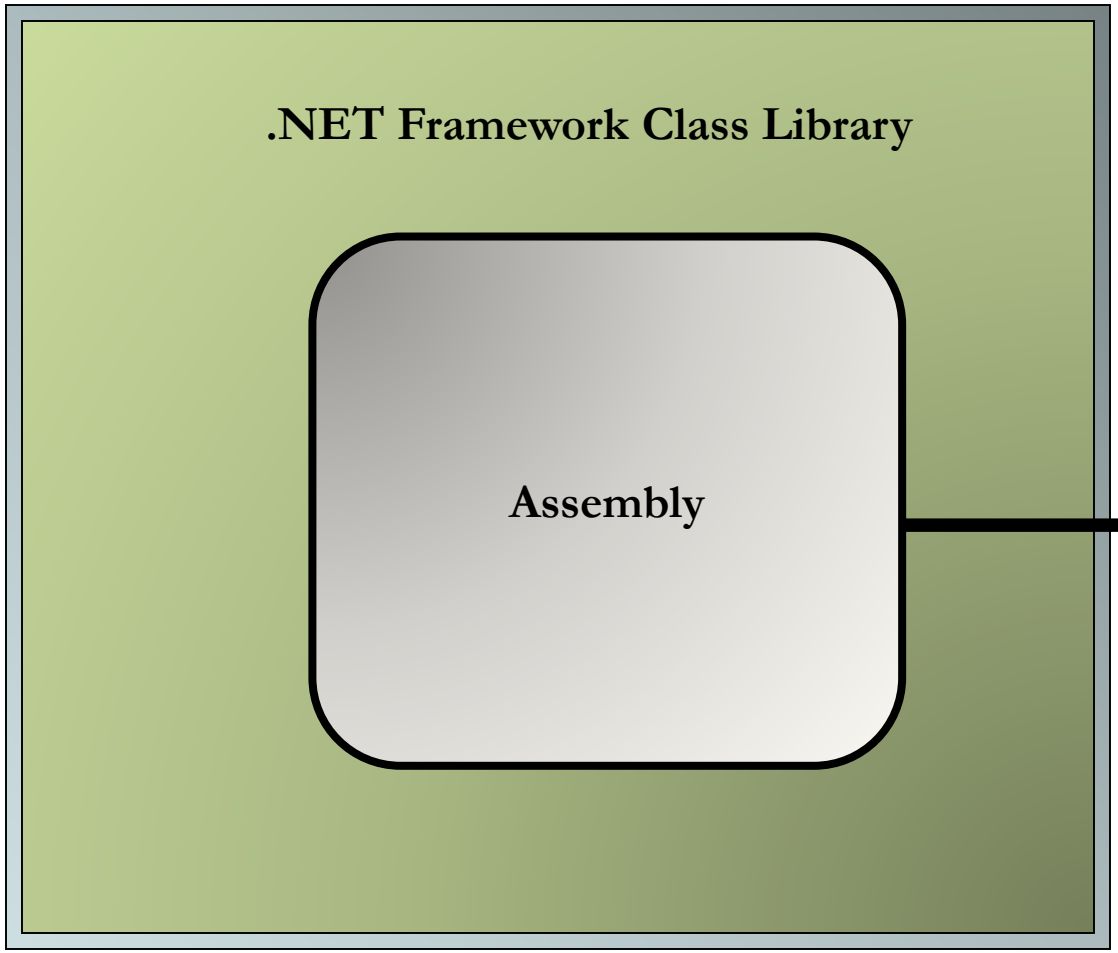
- The .NET Framework Class Library:
  - Works with any .NET language, such as VB.NET, VC++ .NET, and VC#.
  - Provides classes that can be used in the code to accomplish a range of common programming tasks, such as string management, data collection, database connectivity, and file access.
  - Comprises namespaces, which are contained within assemblies.

Components of the .NET Framework (Contd.)



Namespaces help you to create logical groups of related classes and interfaces, which can be used by any language targeting the .NET Framework and are stored in assemblies.

Components of the .NET Framework (Contd.)



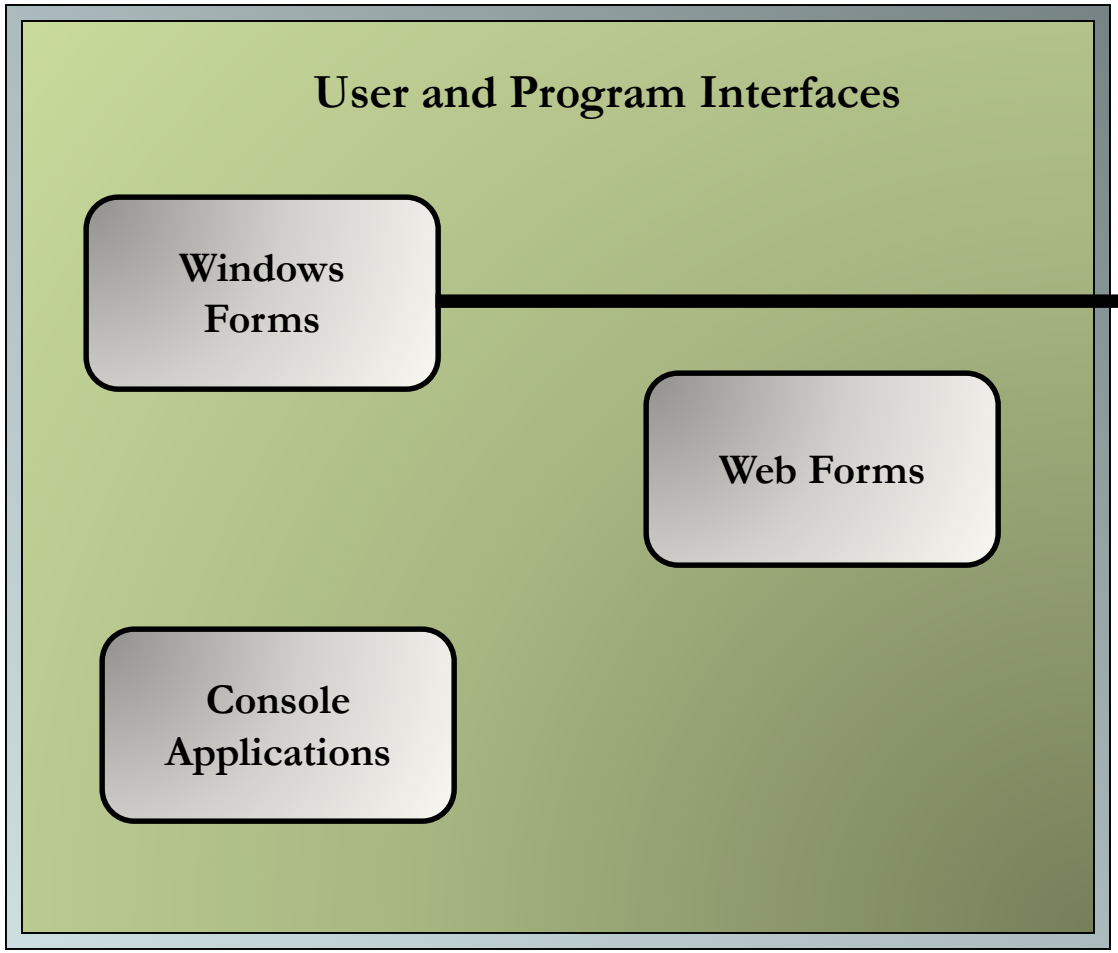
An assembly is a single deployable unit that contains all the information about the implementation of classes, structures, and interfaces.

Components of the .NET Framework (Contd.)

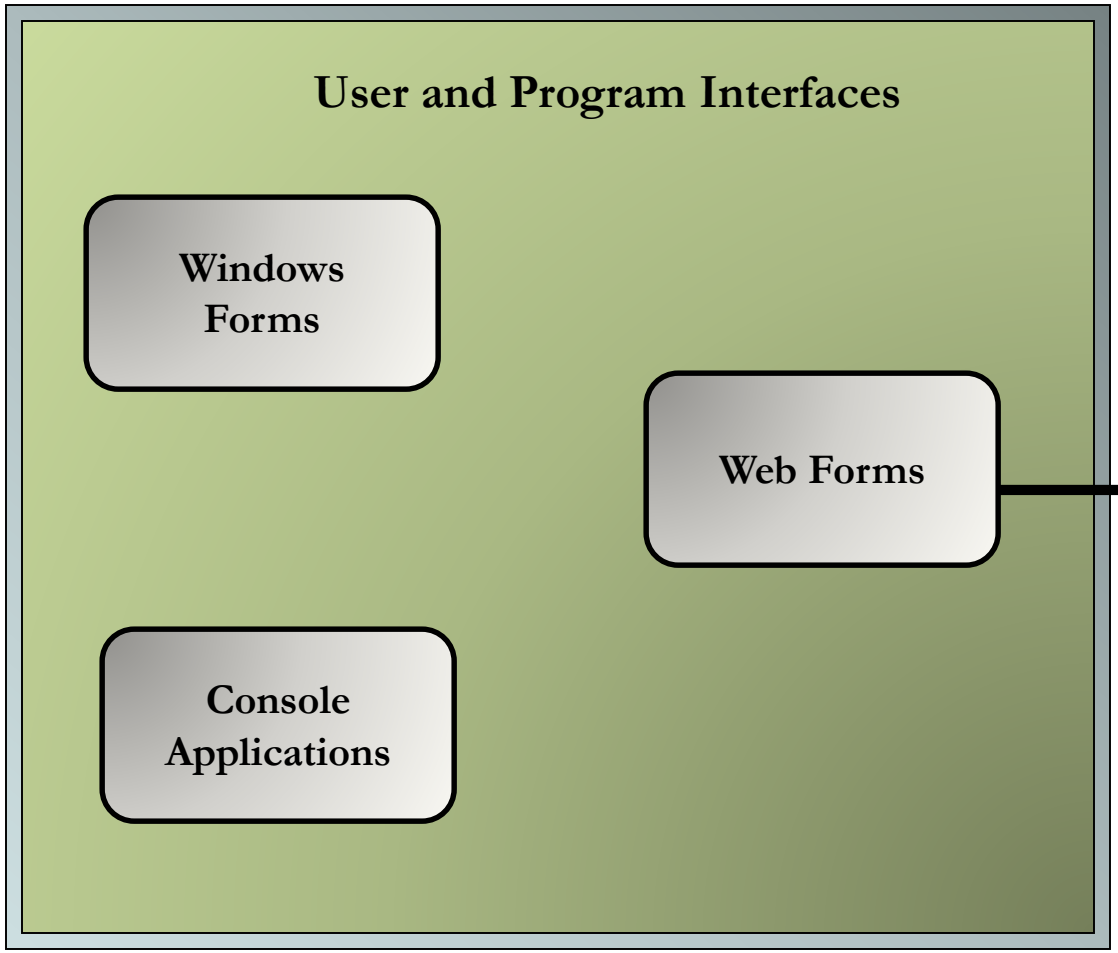
AlmaMate

- User and Program Interfaces: At the presentation layer, .NET provides three types of user interfaces, which are:
  - Windows Forms
  - Web Forms
  - Console Applications
- The .NET provides a program interface called, Web Services, to communicate with remote components.

Components of the .NET Framework (Contd.)

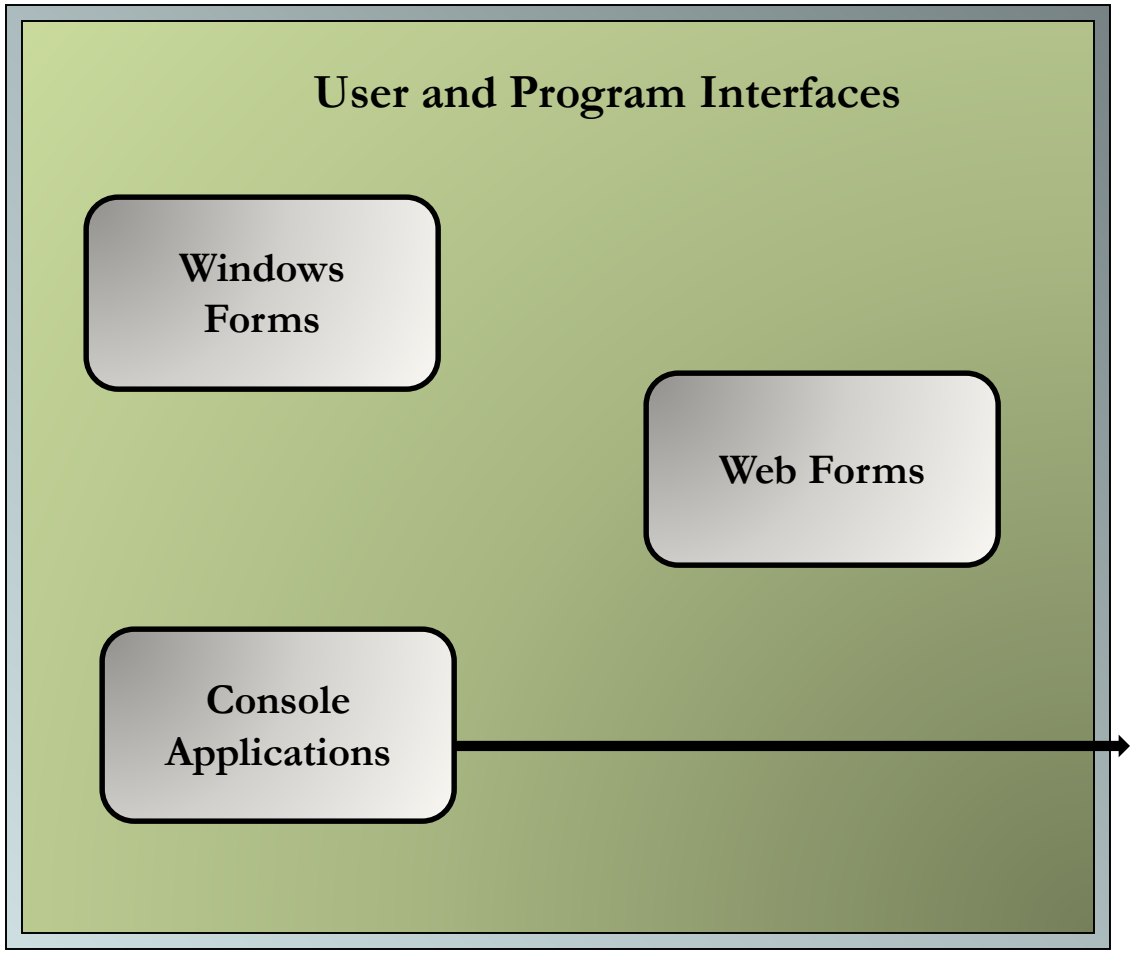


Components of the .NET Framework (Contd.)



These are used in Web-based applications for providing an interactive user interface.

Components of the .NET Framework (Contd.)



These are used to create character-based console applications that can be executed from the command line.

Components of the .NET Framework (Contd.)

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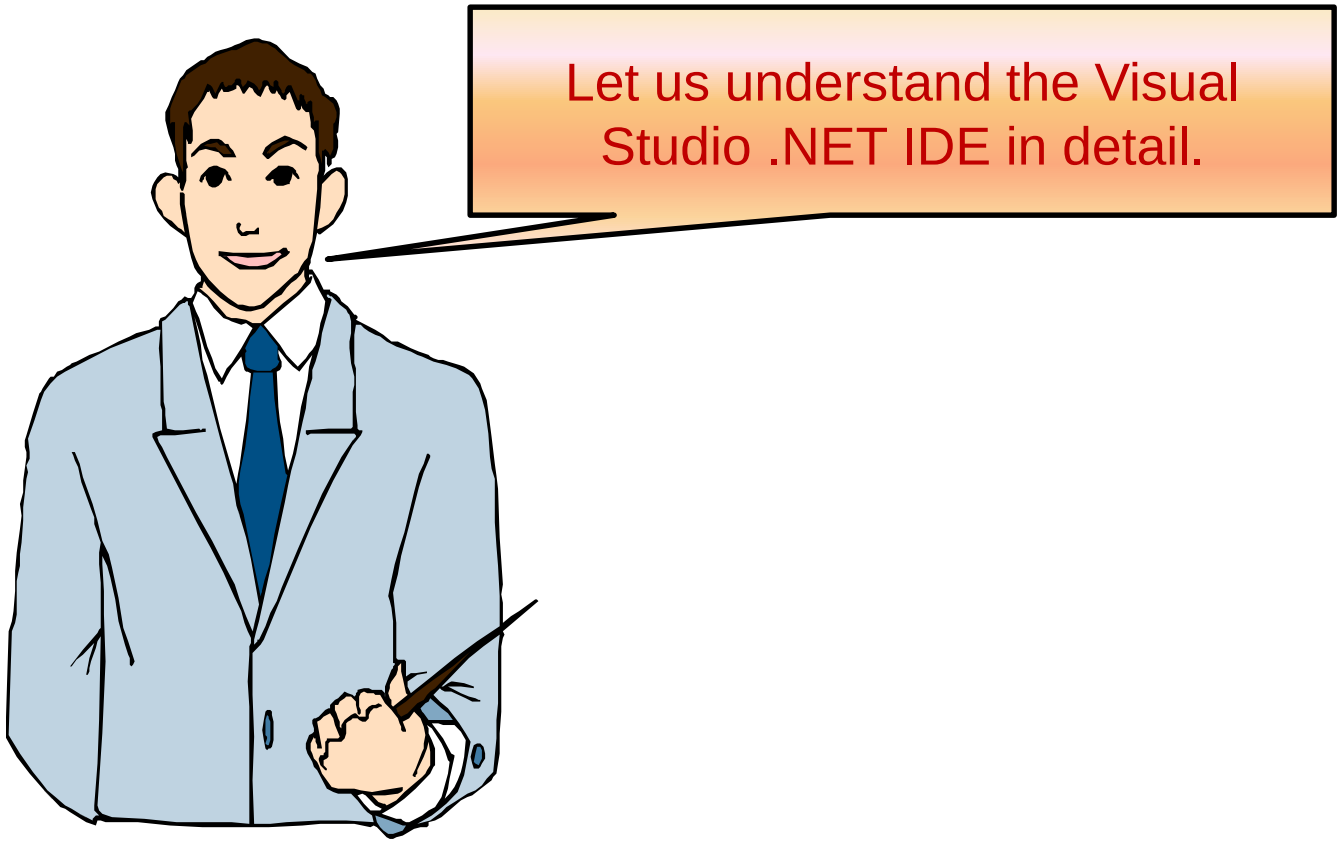
- Some advantages offered by the .NET Framework are:
  - Consistent programming model
  - Multi-platform applications
  - Multi-language integration
  - Automatic resource management
  - Ease of deployment

Understanding Visual Studio .NET IDE



Understanding Visual Studio .NET IDE (Contd.)

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- The Visual Studio .NET IDE provides you with a common interface for developing various kinds of projects for the .NET Framework.
- The IDE also provides you with a centralized location for designing the user interface for an application, writing code, and compiling and debugging the application.
- The Visual Studio .NET IDE is available to all the programmers who use languages in the Visual Studio .NET suite.

Creating Projects and Solutions

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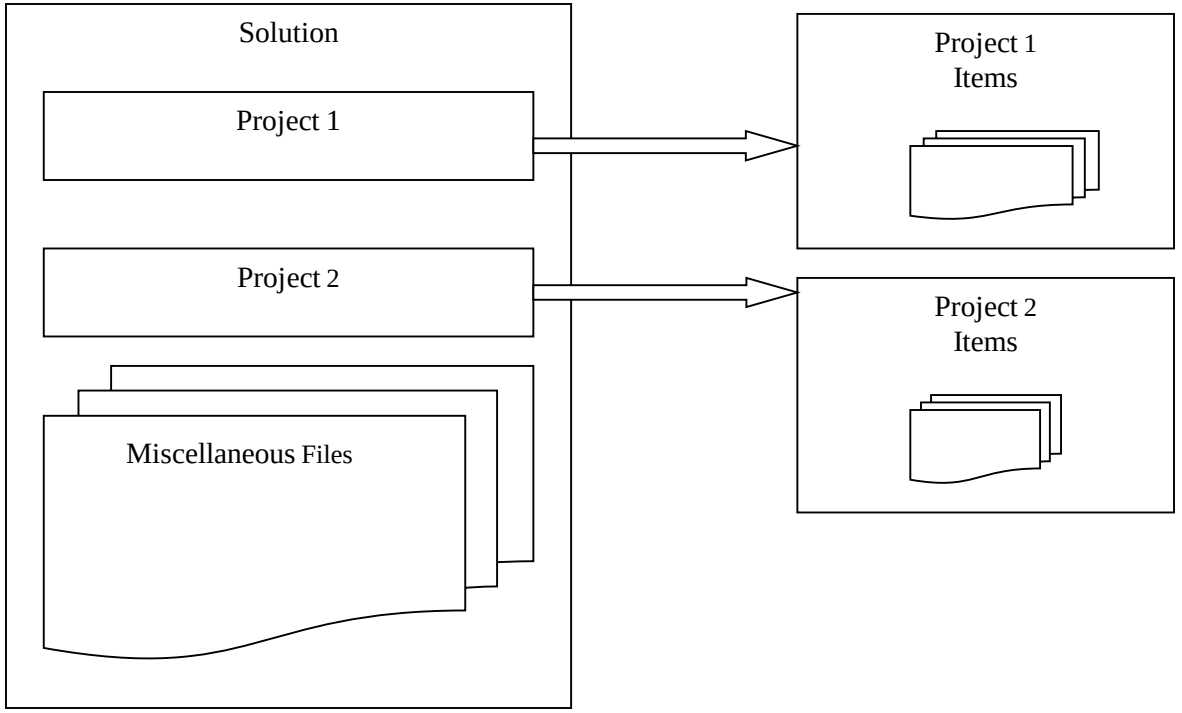
- In Visual Studio .NET, an application can be made up of one or more items, such as files and folders.
- To organize these items efficiently, Visual Studio .NET has provided the following two types of containers:
  - Project: Typically contains items that make up the application. These items are interrelated.
  - Solution: Usually acts as a container for one or more projects.

Creating Projects and Solutions (Contd.)

- The following figure shows a solution containing multiple projects.



Creating Projects and Solutions (Contd.)

- To create a console application in Visual Studio, you need to create a project.
- To create a project, you need to perform the following steps:
  1. Select Start → All Programs → Microsoft Visual Studio 2005 → Microsoft Visual Studio 2005. The Start Page - Microsoft Visual Studio window will be displayed.
  2. Select File → New → Project. The New Project dialog box will be displayed.
  3. In the New Project dialog box, select Visual C# from the Project Types pane and Console Application from the Templates pane.
  4. Specify the name of the application in the Name text box.

Creating Projects and Solutions (Contd.)

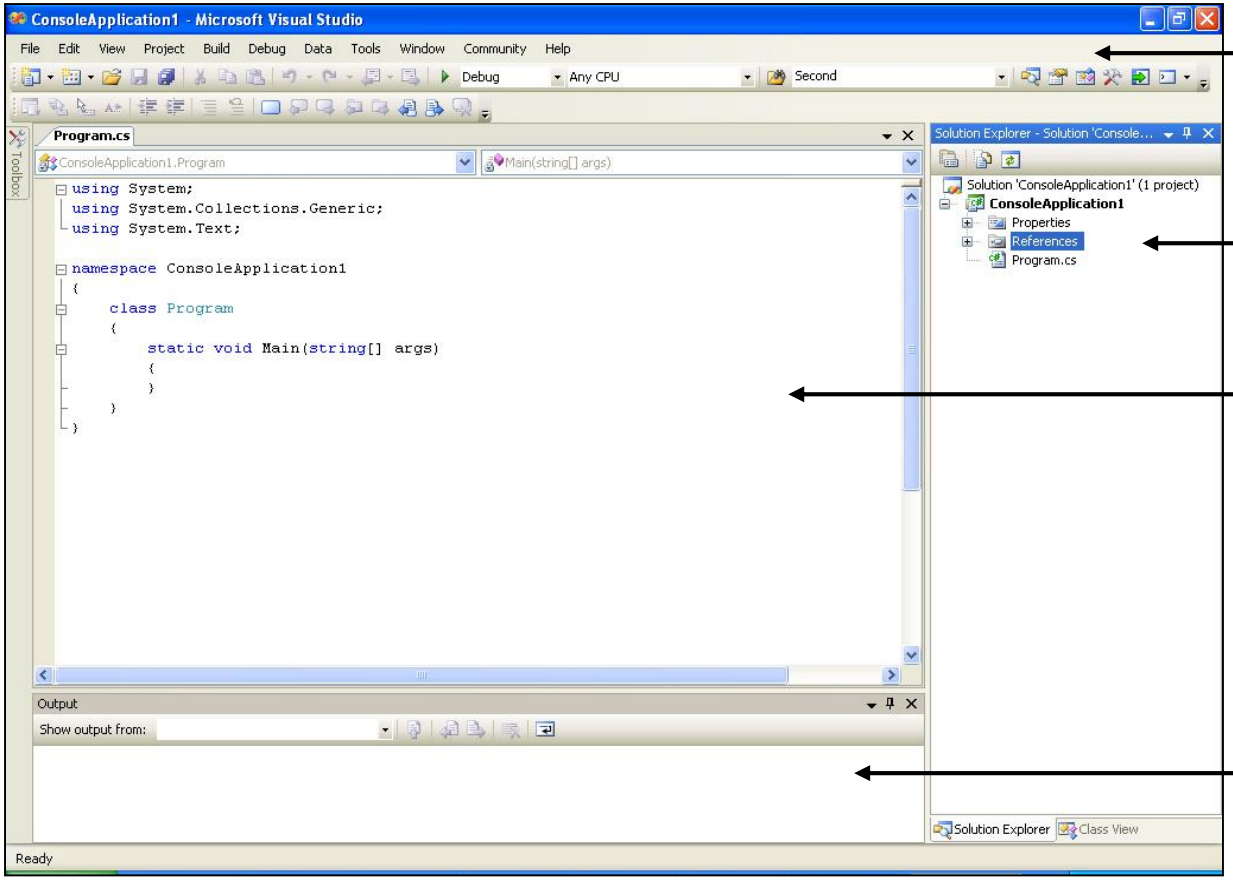
AlmaMate

5. Specify the location where the new project is to be created in the Location combo box. You can use the Browse button to browse to the folder in which the new project is to be created.
6. Click the OK button.

- When you work with a console application project in Visual Studio .NET, you can use the following main elements in Visual Studio .NET IDE:
  - Solution Explorer window
  - Output window
  - Task List window
  - Class View window
  - Code Editor window

Creating Projects and Solutions (Contd.)

- The following figure shows some elements of the Visual Studio .NET IDE.



Creating Projects and Solutions (Contd.)

AlmaMate

- The Standard toolbar is located below the menu bar and provides shortcuts for menu commands.
- The first few buttons of the toolbar enable you to perform tasks common to many Windows-based programs, such as opening a new or an existing file, saving or printing a file, and cutting and pasting text and objects.

Creating Projects and Solutions (Contd.)

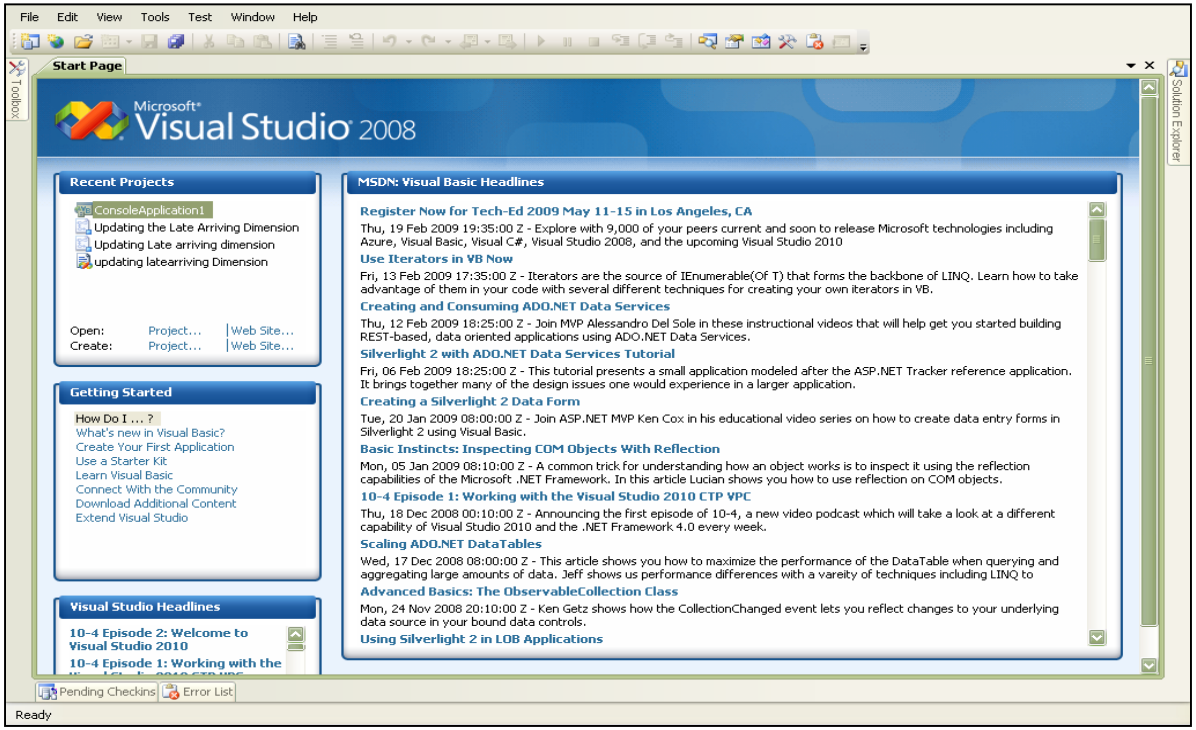
AlmaMate

- The following table lists the name and functions of the various tools of the Standard toolbar.

Name	Button	Function
New Project		*Creates a new project*
Add New Item		*Adds new item in the project*
Save		*Saves the Program*
Save All		*Saves all the unsaved items of the application*
Cut		*Places selected text or objects on the Windows Clipboard*
Copy		*Places a copy of selected text or objects on the Windows Clipboard*
Paste		*Pastes the contents of the Clipboard on the document*
Start Debugging		*Compiles and Executes the current project*

Creating Projects and Solutions (Contd.)

- When you start Visual Studio .NET, it displays the Start Page - Microsoft Visual Studio window.
- The following figure shows the Start Page of Visual Studio .NET.



Creating Projects and Solutions (Contd.)

- The Start Page is the default home page for the browser provided within the Visual Studio .NET IDE.
- When you open Visual Studio .NET, the Projects tab on the Start Page is selected by default.
- This tab displays some of the recent projects and the last date of their modification.
- If the project that you wish to work on is not listed, click the Open Project button on the Start Page.
- If you wish to start with a new project, you can click the New Project button on the Start Page.

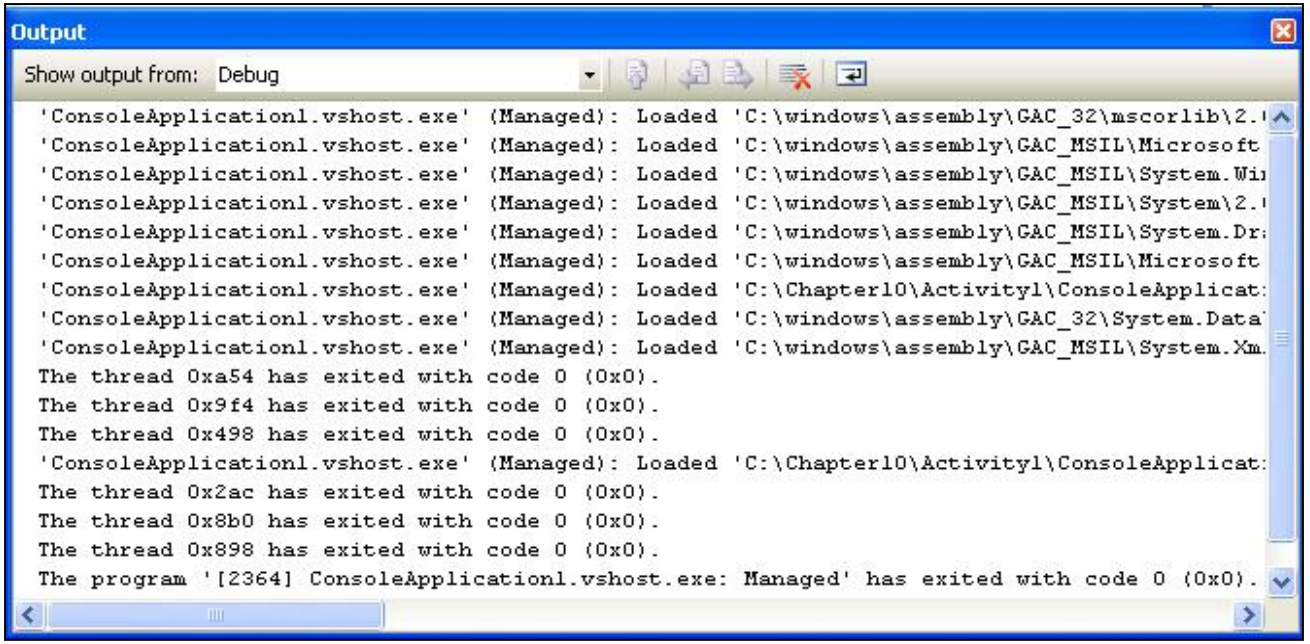
Creating Projects and Solutions (Contd.)

- The Solution Explorer window lists the solution name, the project name, and all the classes that are used in the project.
- The following figure shows the Solution Explorer window.

Creating Projects and Solutions (Contd.)

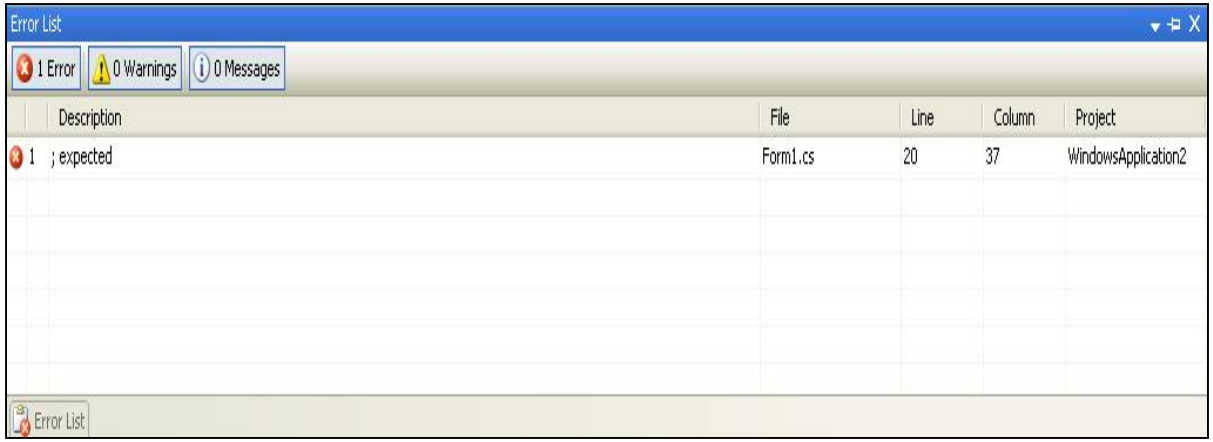
AlmaMate

- The Output window displays messages for the status of various features provided in the Visual Studio .NET IDE.
- The following figure shows the Output window.



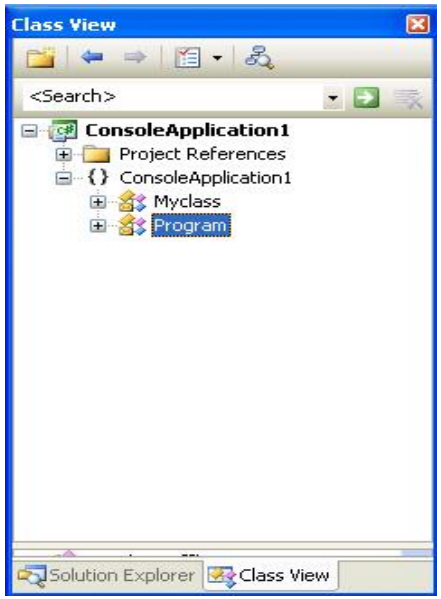
Creating Projects and Solutions (Contd.)

- The Error List window displays a list of errors along with the source (the file and the line number) of the error.
- It helps you identify and locate problems that are detected automatically as you edit or compile code.
- The following figure shows the Error List window.



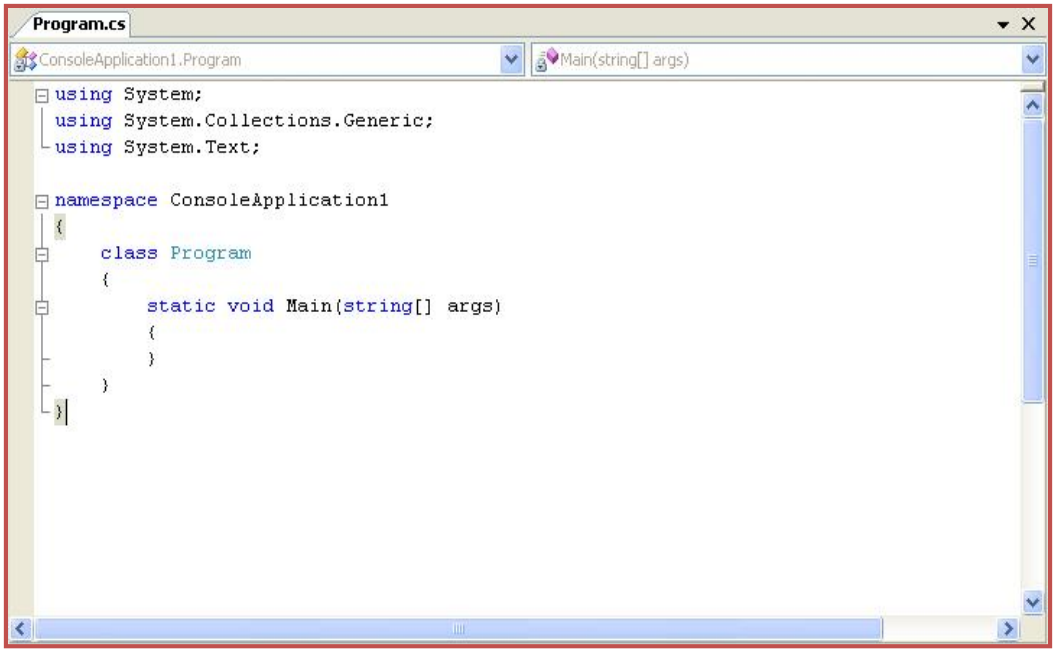
Creating Projects and Solutions (Contd.)

- The Class View window displays the classes, methods, and properties associated with a particular file.
- They are displayed in a hierarchical tree-view showing the containership of these items.
- The following figure shows the Class View window.



Creating Projects and Solutions (Contd.)

- The code editor allows you to enter and edit code.
- You may use the code editor to add code for your class.
- The following figure shows the code editor.



Compiling and Executing Project

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- To compile and execute the application, you need to perform the following steps:
  1. Select Build→Build Solution to compile the application.
  2. Select Debug→Start Debugging or press F5 to execute the application.

Summary

- In this session, you learned that:
  - The .NET Framework is made up of many components, such as CLS, CLR, and JIT compiler.
  - CLS is a set of rules that are followed by all the languages of the .NET Framework.
  - When a program is compiled by using Visual Studio .NET the compiler translates the code into the IL instead of machine language.
  - The JIT compiler is used to translate code from IL into machine language.
  - The CLR is the environment where all .NET applications are executed.

Summary (Contd.)

- The Visual Studio .NET IDE provides you with a common interface for developing various kinds of applications for the .NET Framework.
- Visual Studio .NET provides two types of containers, projects and solutions, to organize the constituents of an application.