Overview of .NET

Introduction to .NET

- A distributed object computing architecture platform for building
  - web-based applications
  - web services
  - stand-alone application

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Building blocks

- Windows server
- Visual Studio.NET
- SQL Server 2000
- BizTalk Server 2000
- Commerce Server 2000
- Exchange Server
- Mobile Information 2001 Server

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History and evolution of .NET

- MS-DOS
- Win32
- COM and ActiveX
- ASP
- DNA (Distributed interNet Architecture)
- .NET Framework → .NetFx →late 1990

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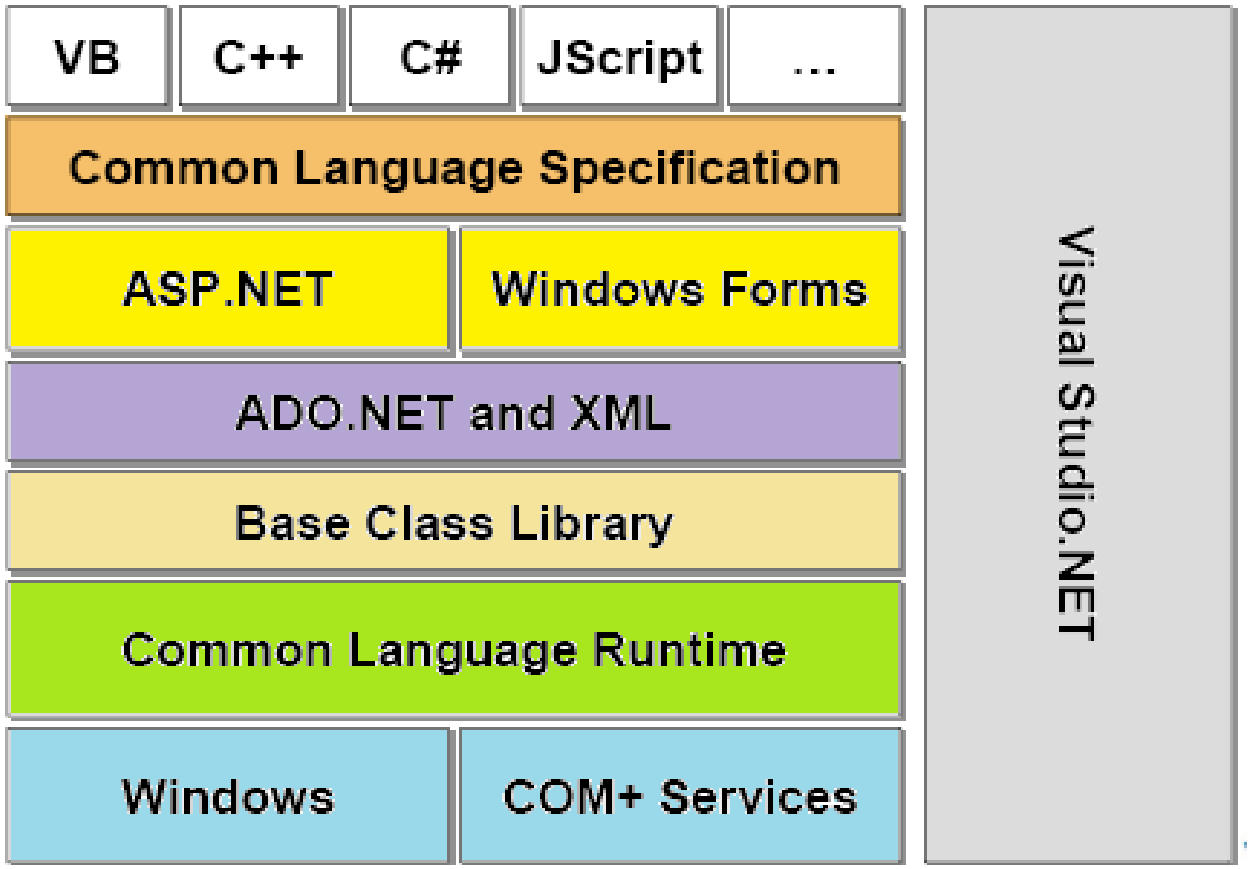
.NET Framework



Features

- Language Independence
- Interoperability
- Base Class Library
- Common Runtime Engine
- Portability
- Security
- Multi-language development
- Messaging
- Memory Management

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Versions

- NET Framework 1.0 → 2002-01-05
- NET Framework 1.1
- NET Framework 2.0
- NET Framework 3.0
- NET Framework 3.5

Our focus

CLI and CLR

- Common Language Infrastructure
- CLI provides a language-agnostic platform for
  - application development
  - deployment and execution
  - exception handling
  - garbage collection
  - security
  - interoperability
  - Threading

- Microsoft's implementation of the CLI is called the Common Language Runtime (or CLR.)

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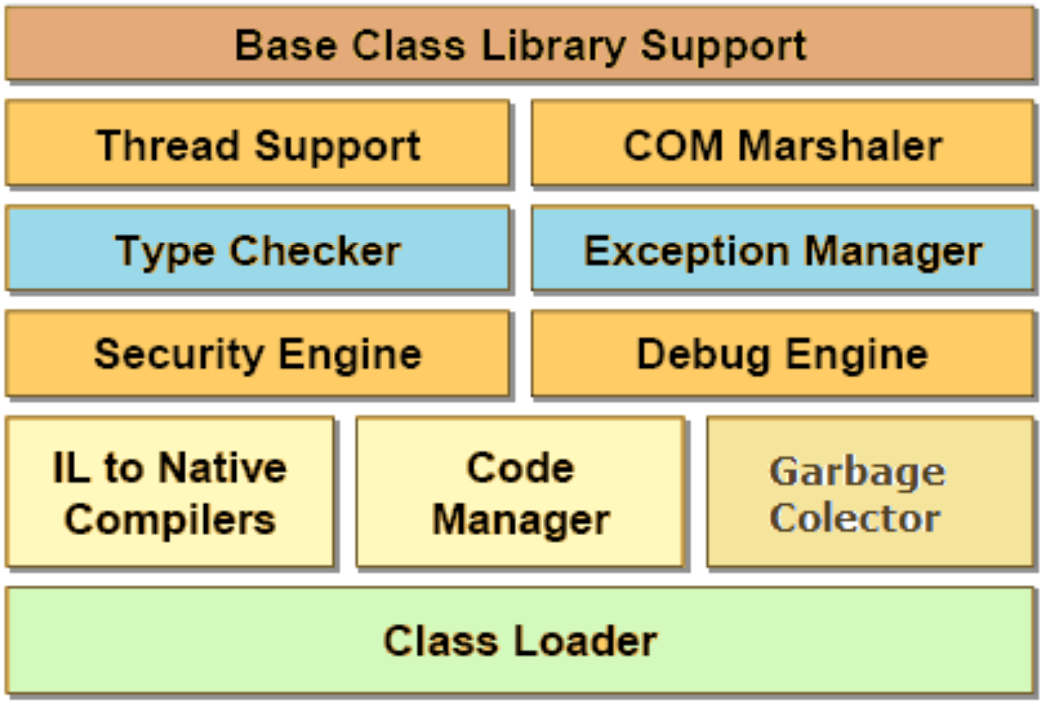
CLR architecture



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CLS

- The Common Language Specification
- It is a set of base rules to which any language targeting the CLR should conform in order to interoperate with other CLS-compliant languages.
- The CLS rules define a subset of the Common Type System.

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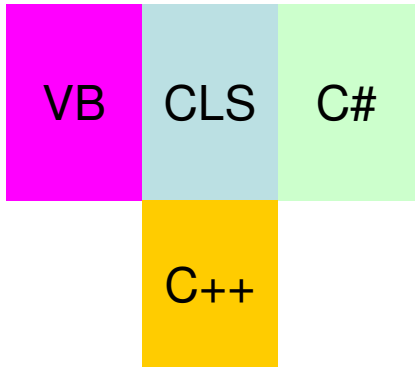
CTS

- Common Type System
- It is a standard that specifies how Type definitions and specific values of Types are represented in computer memory.
- It is intended to allow programs written in different programming languages to easily share information.



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Languages Supported by .NET

- C#
- C++
- VB
- J#

- PRIMARY LANGUAGES

- JScript
- Perl
- Cobol
- SmallTalk
- Scheme
- Python
- And many more

Any language that implements CLS could be part of .NET languages

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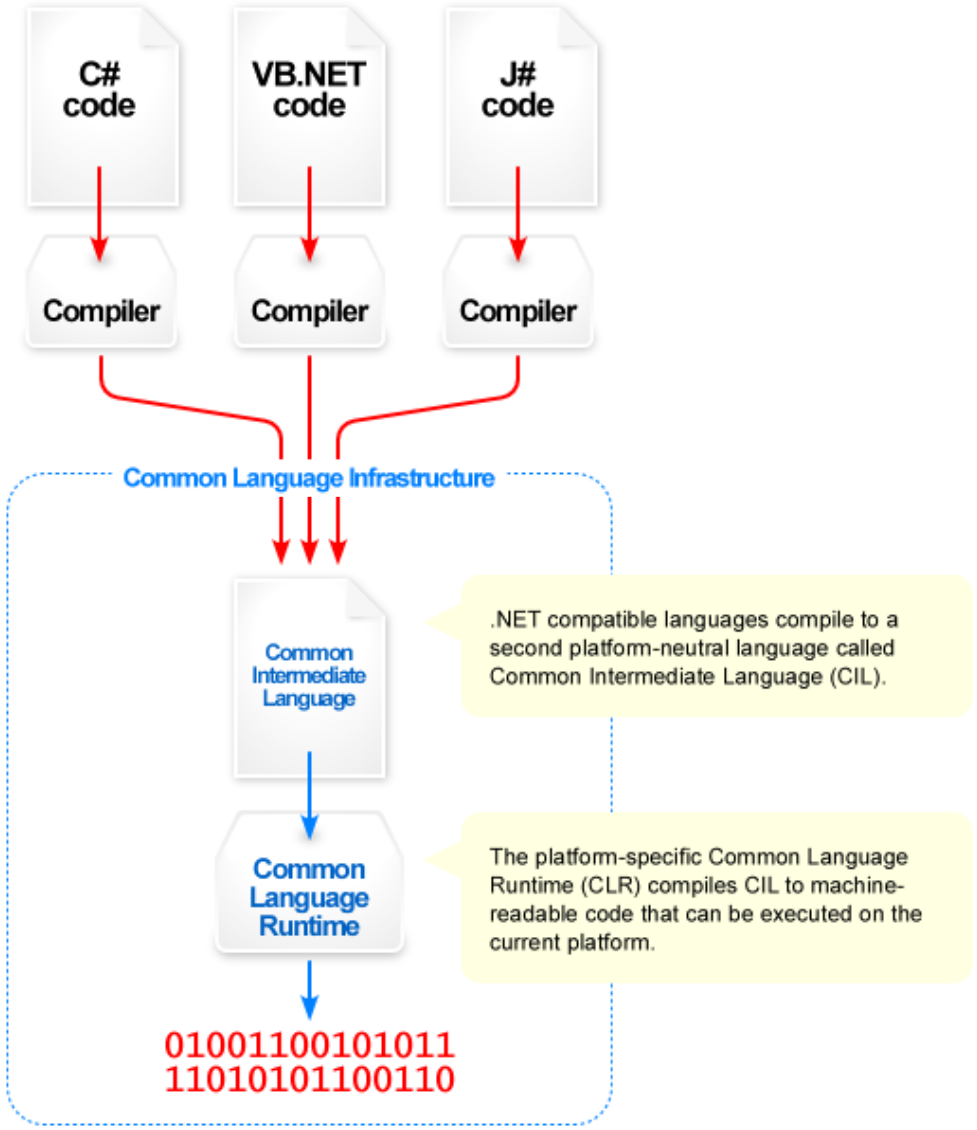
.NET compilation model



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CIL

- Common Intermediate Language or Microsoft Intermediate Language or MSIL
- It is the lowest-level human-readable programming language in the Common Language Infrastructure.
- Languages which target the .NET Framework compile to CIL, which is assembled into bytecode.

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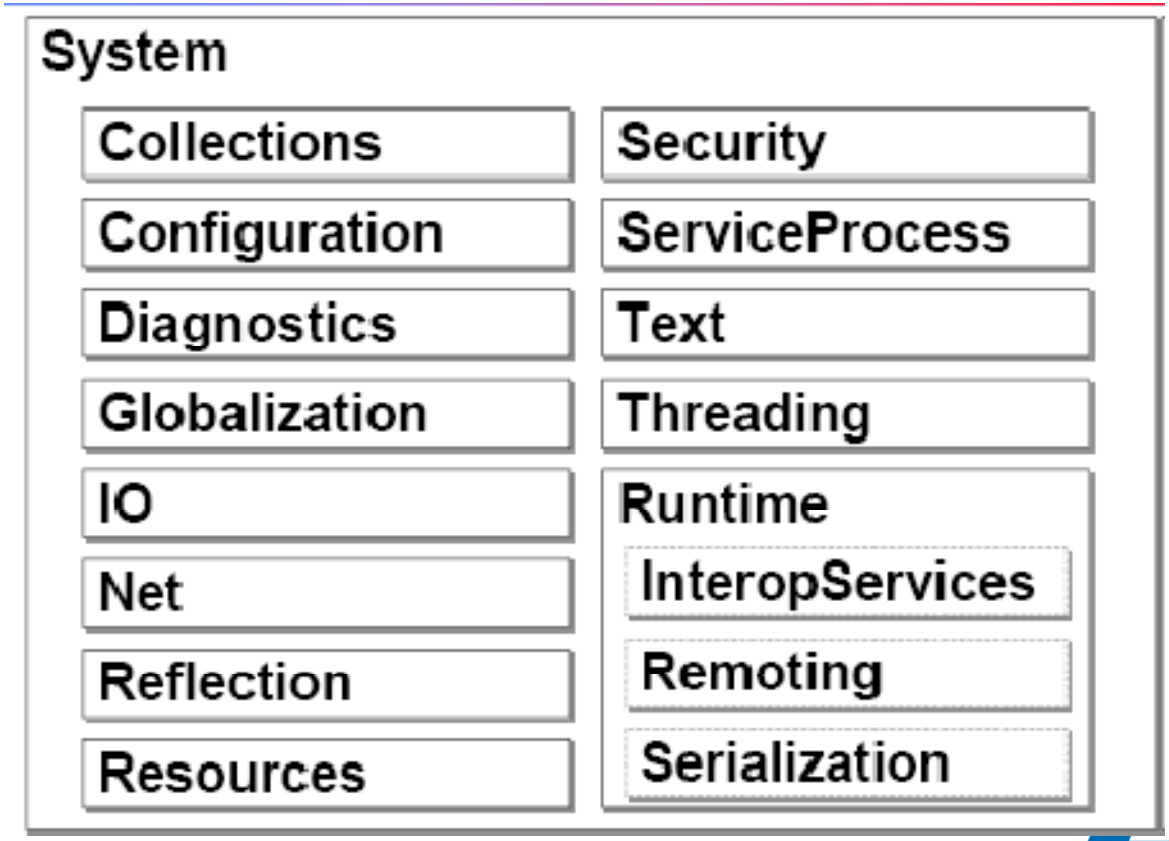
BCL

- The Base Class Library (BCL) is a standard library available to all languages using the .NET Framework.



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.NET metadata

- Refers to certain data structures embedded within the Common Intermediate Language code that describes the high-level structure of the code.
- A .NET language compiler will generate the metadata and store this in the assembly containing the CIL.
- Metadata describes all classes and members that are defined in the assembly. When the CLR executes CIL it will check to make sure that the metadata of the called method is the same as the metadata that is stored in the calling method.
- Developers can add metadata to their code through **attributes.**

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ADO.NET

- Library gives database Support in .NET
- It is a part of the base class library
- Visual Studio can be used to create create specialized subclasses of the DataSet classes for a particular database schema
- ADO is ActiveX Data Objects

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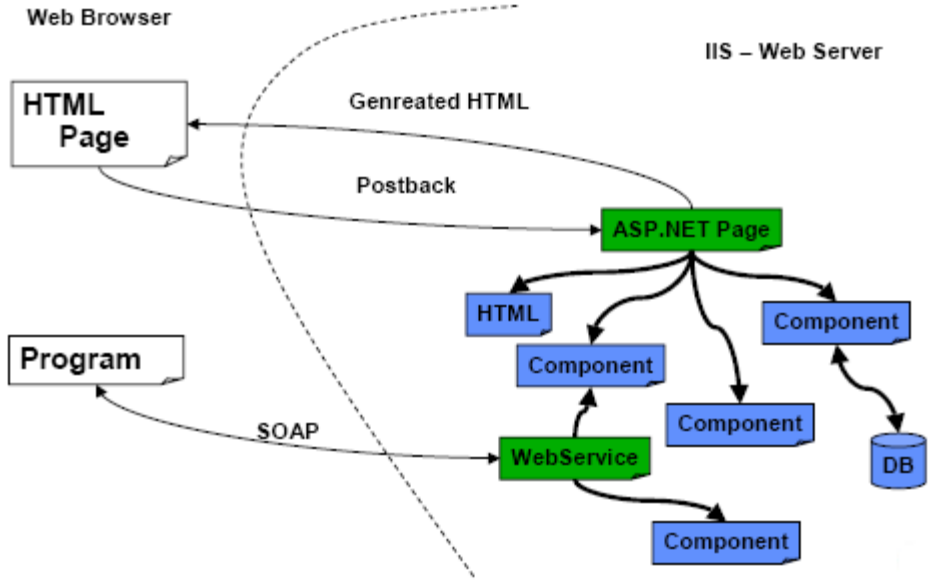
ASP.NET

- ASP.NET is a web application framework to build dynamic web sites, web applications and web services .
- successor to Microsoft's Active Server Pages (ASP) technology.
- Uses IIS



Winforms

- Winforms is GUI application programming interface (API) included as a part of Microsoft's .NET Framework.
- It provides access to the native Microsoft Windows interface elements by wrapping the existing Windows API in managed code.

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Managed vs. Unmanaged code

- Managed Code makes use of CLR services and unmanaged code does not use any services
- Managed code is code written in one of .NET languages (C#, J#, Visual Basic, C++).
- Using managed code many programming errors that lead to security holes, unsafe type casting, memory errors can be avoided.
- The Microsoft .NET Framework allows interaction with COM components, COM+ services, external type libraries, and many operating system services.
- COM components, ActiveX interfaces, and Win32 API functions are examples of unmanaged code.

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Visual Studio

- IDE for creating .NET applications which are
  - Console based
  - Web based
  - Windows form based
  - Web services
- Features
  - Page design
  - Automatic error detection
  - Debugging tools
  - IntelliSense

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Versions

- Visual Studio 6.0
- Visual Studio .NET (2002)
- Visual Studio .NET 2003
- Visual Studio 2005
  - ASP.NET 2.0
- Visual Studio 2008
  - ASP.NET 3.5

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Editions

- Visual Studio Express
  - free lightweight individual IDEs.
  - includes only a small set of tools as compared to the other systems – doesn't have of remote database support for data designer, class designer and several other tools and features as well as support for plug-ins
- Visual Studio Standard :
  - Visual Studio Standard Edition provides an integrated IDE for all supported products and can support the entire MSDN library. It supports XML and XSLT editing, test benches, and can create deployment packages that only use ClickOnce. However, it does not include tools like Server Explorer or include integration with Microsoft SQL Server.
- Visual Studio Professional
  - integration with Microsoft SQL Server.

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Introduction to assemblies

- Assemblies are self-describing installation units, consisting of one or more files.
- An assembly contains a set of files :- Intermediate Language (IL) code, meta data and manifest file for an application.
- It is automatically generated by the compiler upon successful compilation of every .NET application.
- It can be either a Dynamic Link Library or an executable file.
- It is generated only once for an application and upon each subsequent compilation the assembly gets updated.

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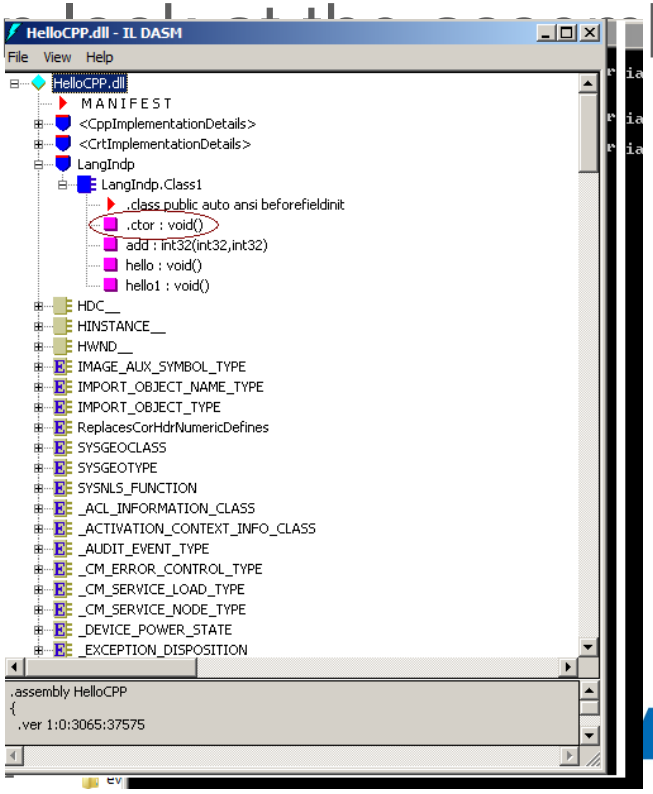
Dissecting the Intermediate Language (IL) Code

- Disassembler utility included with the .NET Framework SDK called **`ildasm`**.
- Using this tool you can load and browse assembly contents.



Assemblies benefits

- Assemblies advantages (over Older COM/DLLs)
  - Version
  - Not entry required in windows registry
  - Can be private or shared

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