Object Oriented Frameworks

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.NET – What Is It?

- Software platform.

- Language neutral.

- In other words:

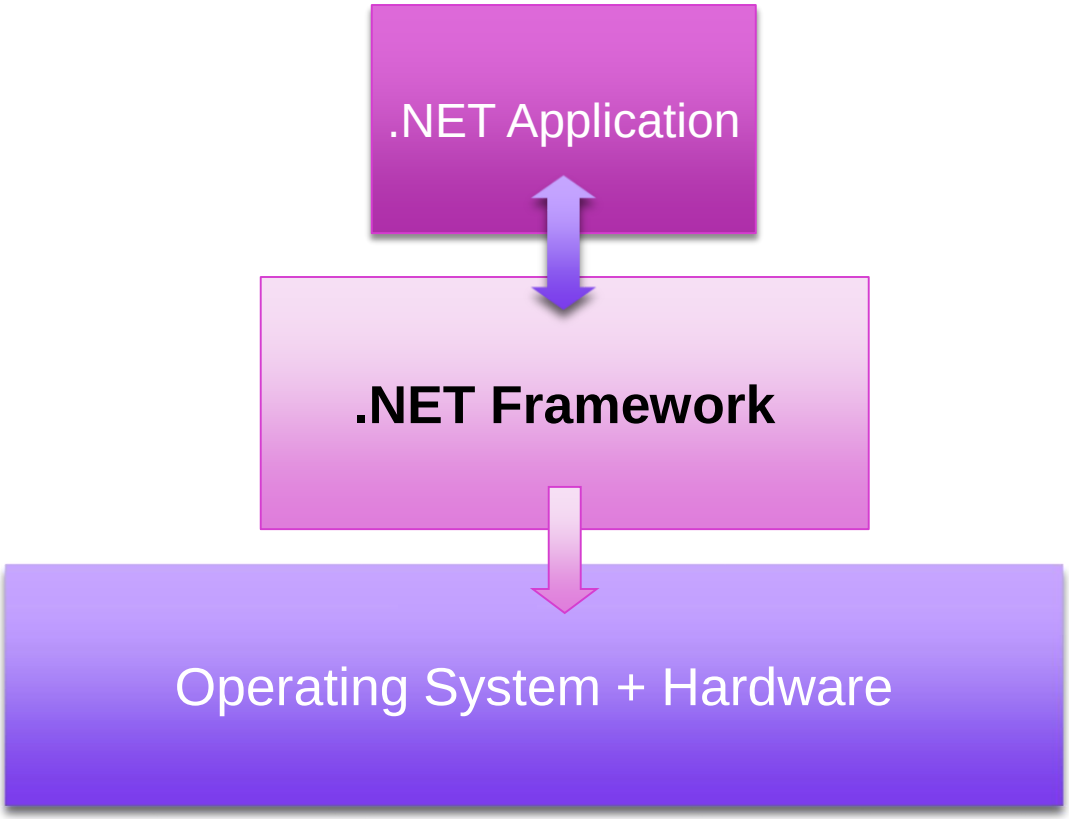
  .NET is not a language (**Runtime and a library** for writing and executing written programs in any compliant language).

What Is .NET

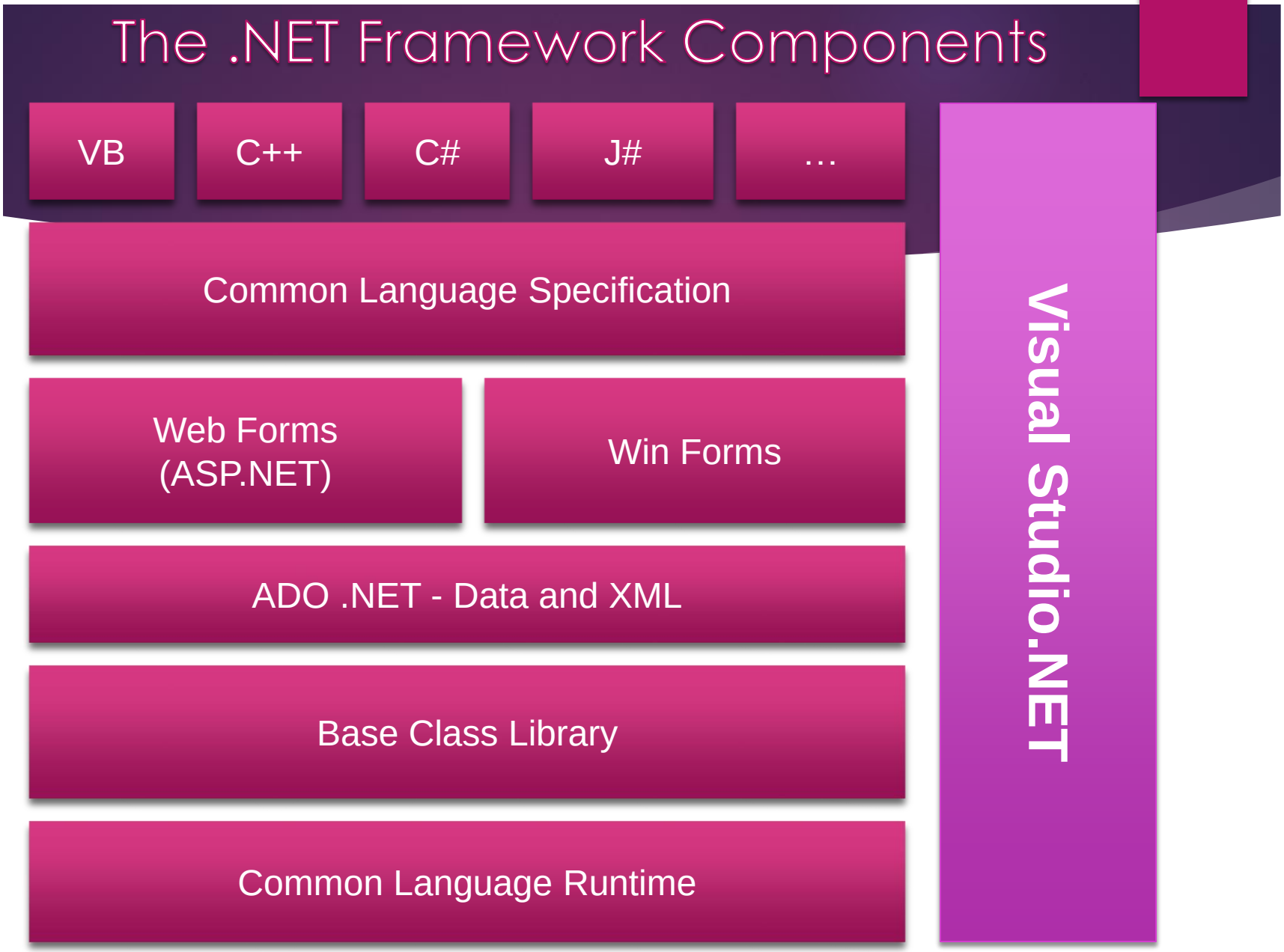
- **.Net** is a framework for developing *web-based* and *windows-based* applications within the Microsoft environment.

- The framework offers a fundamental shift in Microsoft strategy:
  - it moves application development from client-centric to server-centric.

.NET

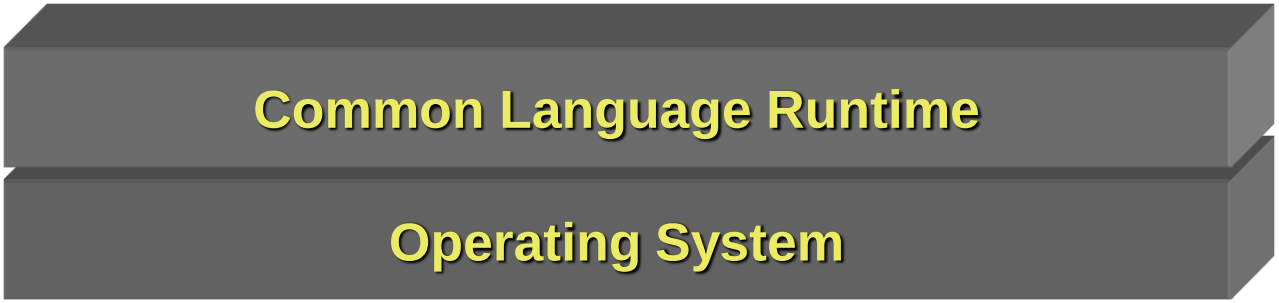


The .NET Framework Components



Common Language Runtime

- CLR manages code execution at runtime.
- Memory management, thread management, etc.

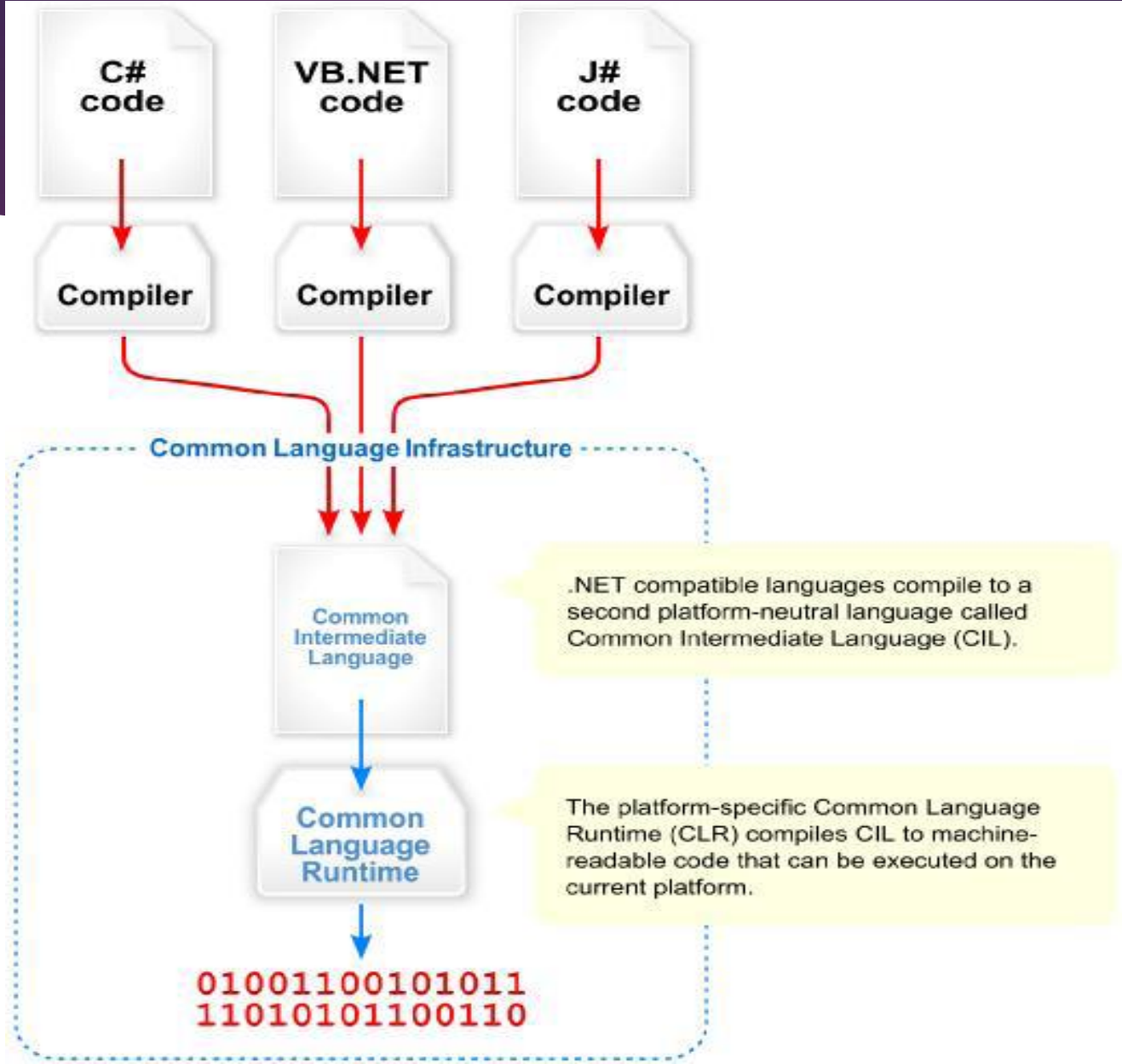


Common Language Runtime (CLR)

- CLR works like a virtual machine in executing all languages.

- All .NET languages must obey the rules and standards imposed by CLR. Examples:

  - Object declaration, creation and use.
  - Data types, language libraries.
  - Error and exception handling.


C# code
VB.NET code
J# code
Compiler
Compiler
Compiler
Common Language Infrastructure
Common Intermediate Language
.NET compatible languages compile to a second platform-neutral language called Common Intermediate Language (CIL).
Common Language Runtime
The platform-specific Common Language Runtime (CLR) compiles CIL to machine-readable code that can be executed on the current platform.
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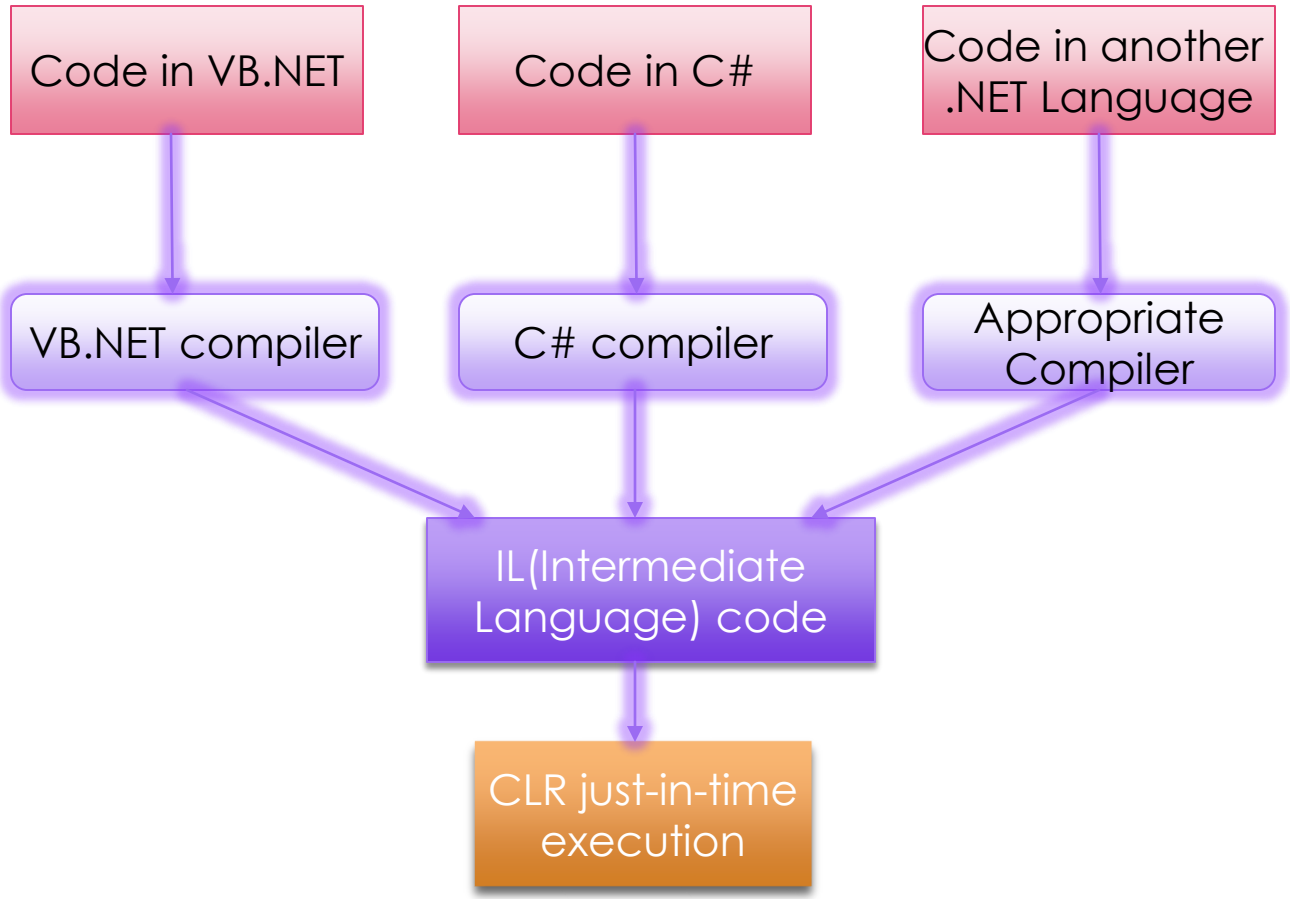
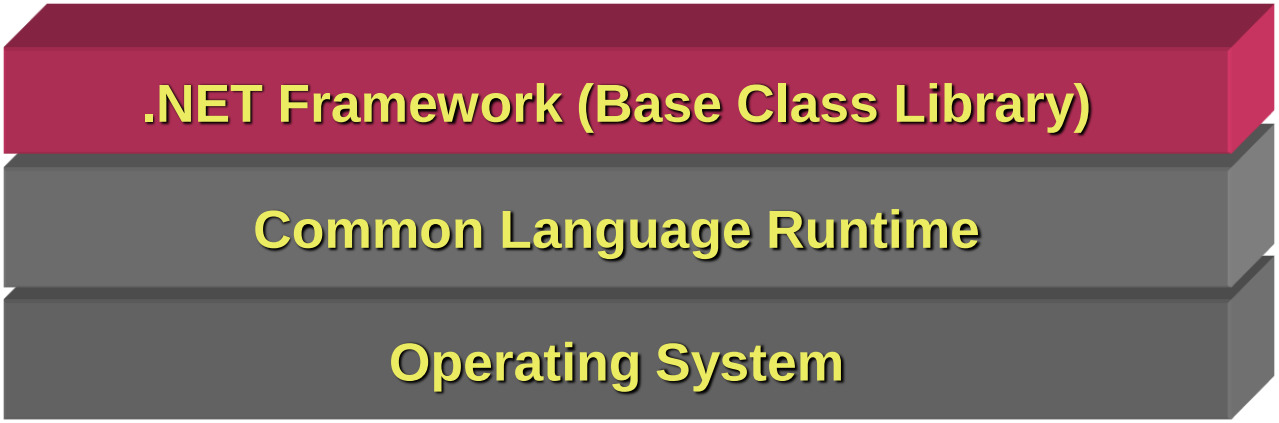
Compilation in .NET



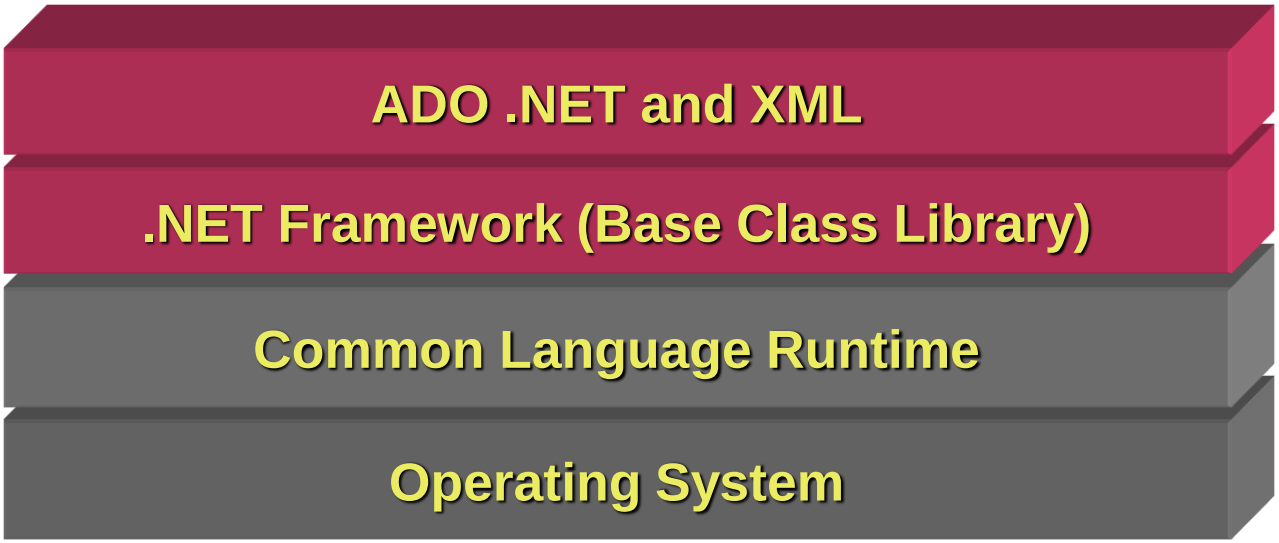
Base Class Library

- Object-oriented collection of reusable types.
- Collections, I/O, Strings, …



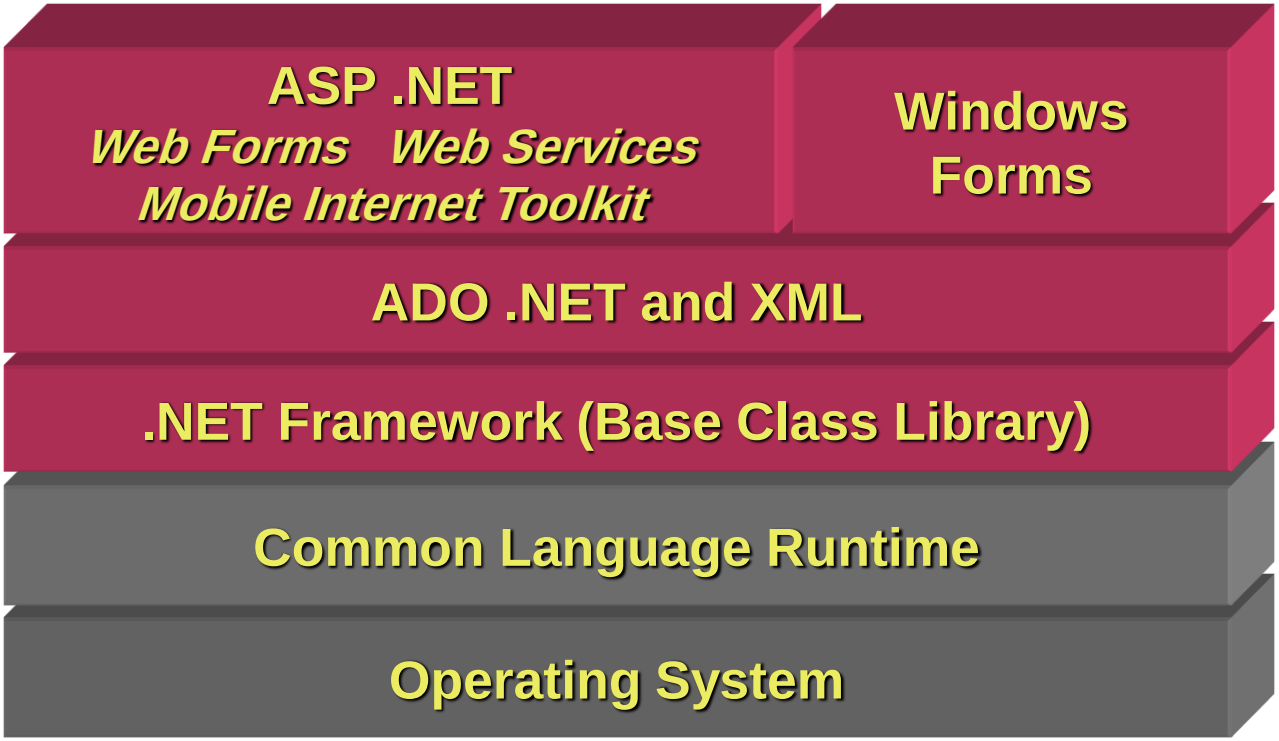
Data Access Layer

- Access relational databases.
- Work With Any Databases like SQL Server,MySQL,Oracle.
- Work with XML.



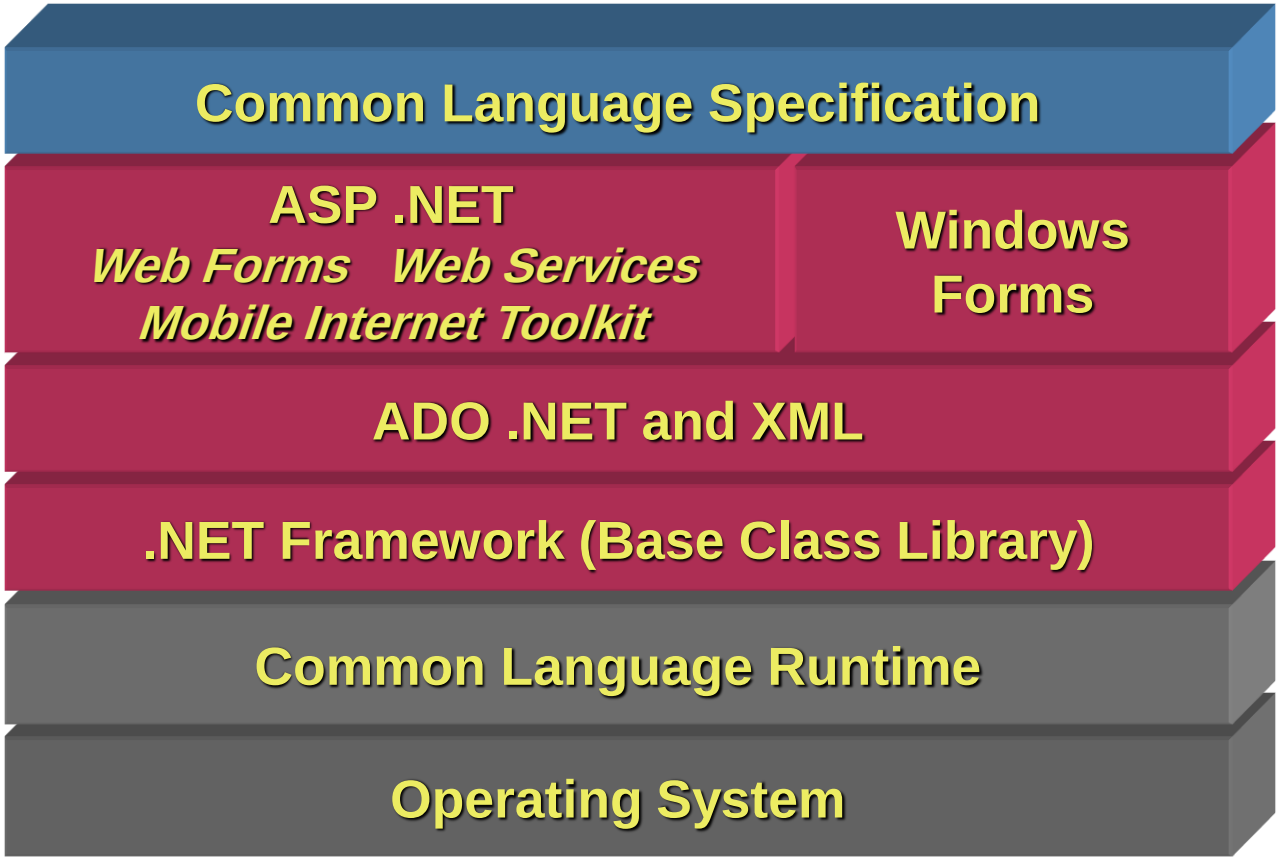
ASP.NET & Windows Forms

- Create application's Web-based user interface, Windows GUI, Web services, …



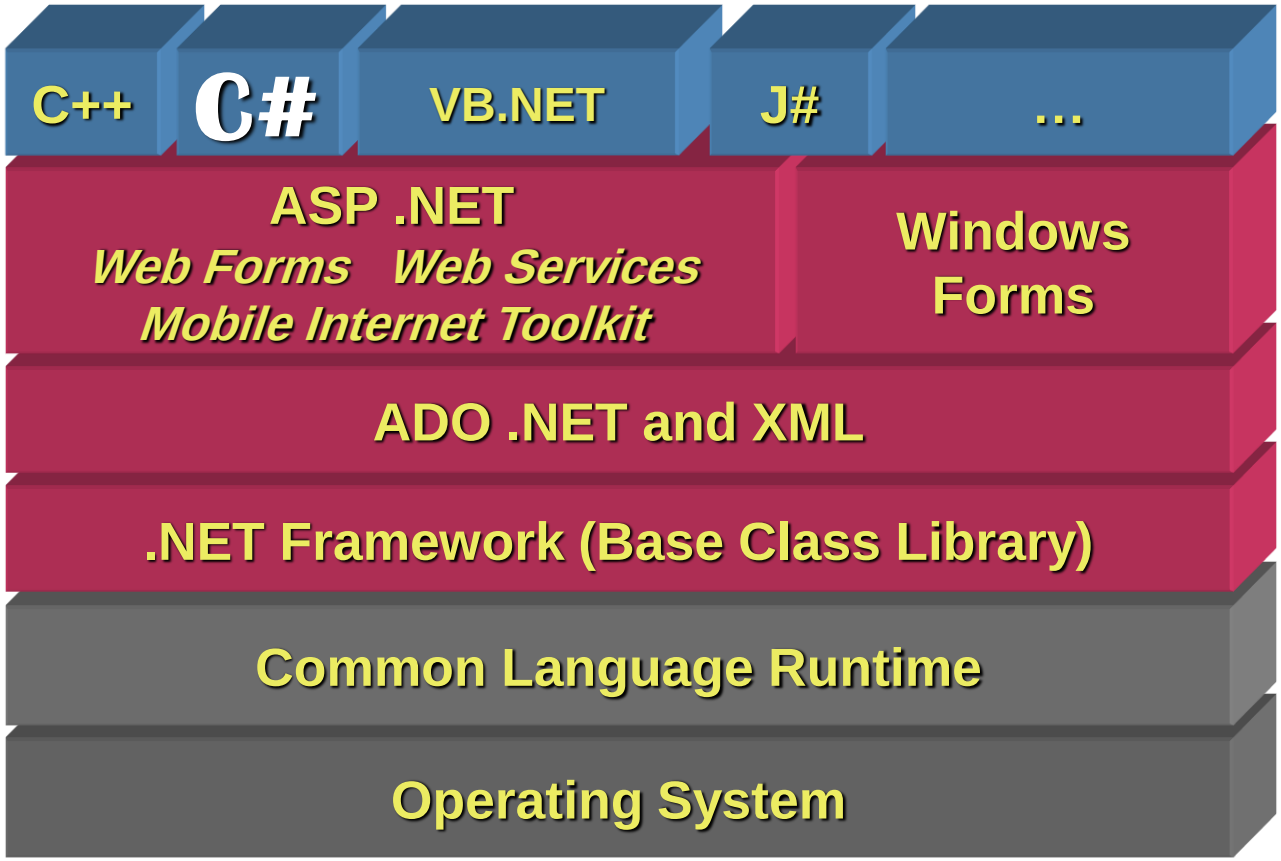
Common Language Specification

- which is a set of basic language features needed by many applications, has been defined.



Programming Languages

- Use your favorite language

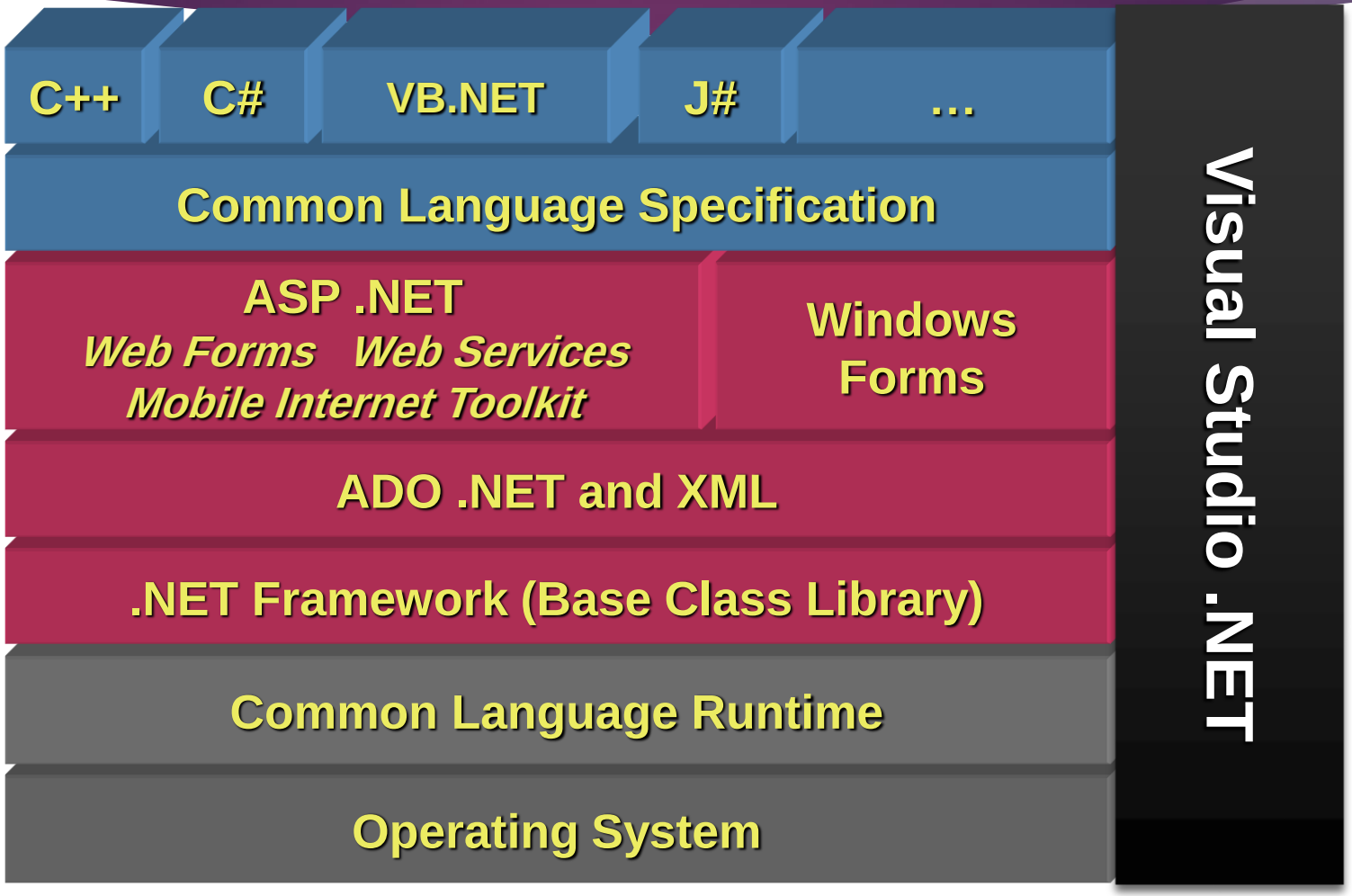


Common Type System (CTS)

- All .NET languages have the same primitive data types.
  - An *int* in C# is the same as an *int* in VB.NET

- When communicating between modules written in any .NET language,
  - the types are guaranteed to be compatible on the binary level.

Visual Studio .NET



.Net platform features

- Automatic memory management.
- **Object Oriented features in any languages.**
- Accessing system functionality throw a hierarchical **namespace**.
- Code security.
- Interoperability with COM.

The best way to handle a large list of system objects and functions.

Visual Studio .NET

- Development tool that contains a rich set of productivity and debugging features.
  - Supports **managed** and **unmanaged** applications.
  - Supports C#, C++, VB.NET, …
  - Many useful tools and wizards.
  - Windows Forms Designer.
  - ASP.NET Web Forms Designer.
  - Web Services support.
  - SQL Server integration with ADO.NET and XML.
- VS.NET is not part of the .NET Framework.
  - Not necessary to build or run managed code.
  - The .NET Framework SDK includes command line compilers.

Summary

- The .NET Framework
  - Dramatically simplifies development and deployment.
  - Provides robust and secure execution environment.
  - Supports multiple programming languages.

.NET Framework Namespaces

System.Web

- Services
  - Description
  - Discovery
  - Protocols
- UI
  - HtmlControls
  - WebControls
- Caching
- Security
- Configuration
- SessionState

System.WinForms

- Design
- ComponentModel

System.Drawing

- Drawing2D
- Printing
- Imaging
- Text

System.Data

- ADO
- SQL
- Design
- SQLTypes

System.Xml

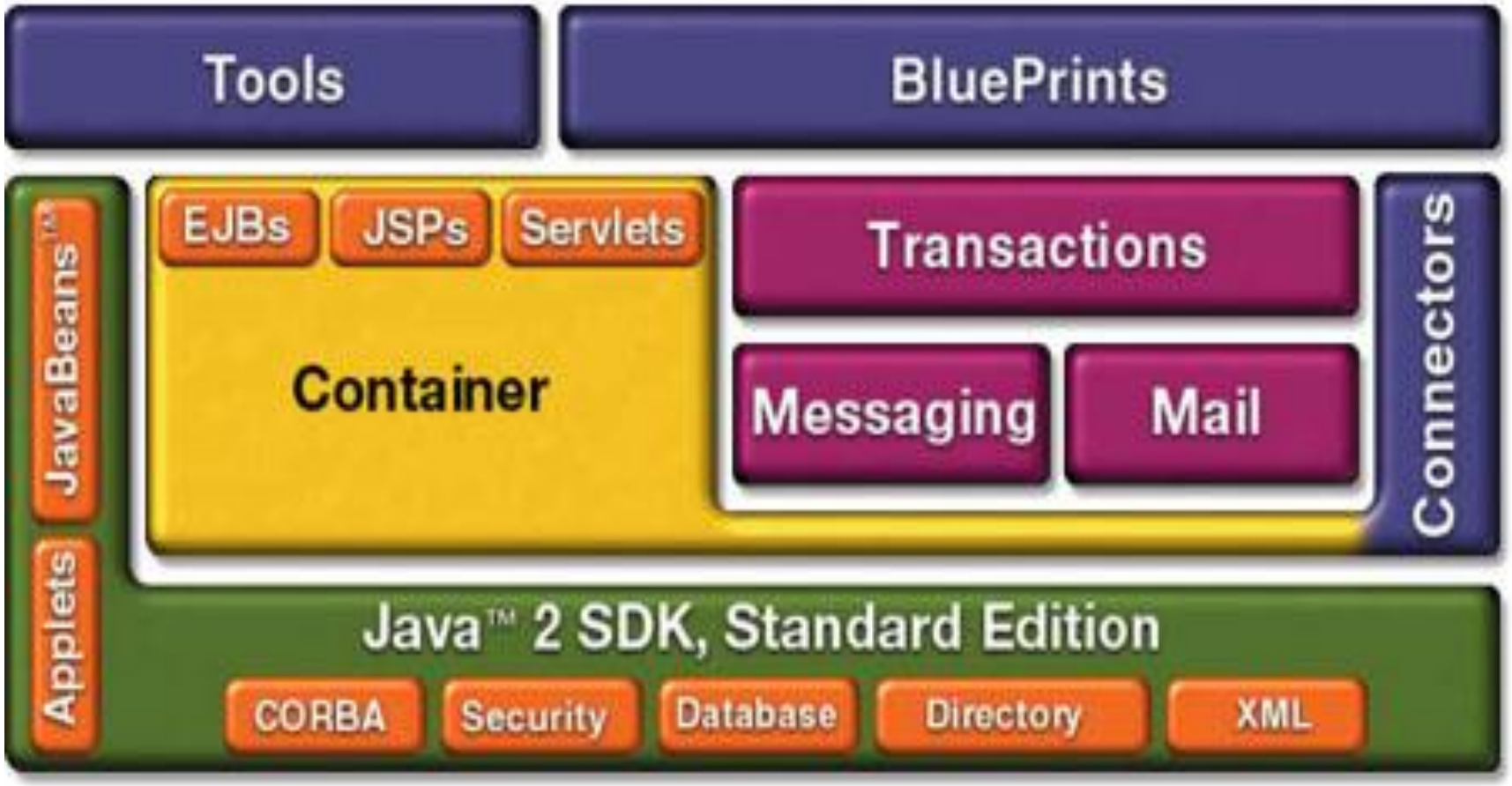
- XSLT
- Serialization
- XPath

System

- Collections
- IO
- Security
- Runtime
  - InteropServices
  - Remoting
  - Serialization
- Configuration
- Net
- ServiceProcess
- Diagnostics
- Reflection
- Text
- Globalization
- Resources
- Threading

Comparison between J2EE and .NET

J2EE Components



J2EE and .NET

Execution Engine.

- **J2EE**
  - Java source code compiles into machine-independent **byte code**.
  - Runtime Environment : **JVM**
- **.NET**
  - Any compliant language compiles into MSIL Runtime environment : CLR.

Both JVM and CLR ,support services, such as code verification, memory management via garbage collection, and code security.

J2EE and .NET

Cross Platform Portability.

- **J2EE**
  Platform Independent .
  JDK should exist on target machine.
- **.NET**
  Supports Windows platform.
  CLR should exist on target machine.
  Can support other platforms provided it has its own JIT complier .(such as **MONO**)

J2EE and .NET

Language Support.

- **J2EE**
  - Tied to Java.
- **.NET**
  - Language independent.
  - Supports any language if mapping exists from that language to IL.

J2EE and .NET

Tools Support.

- **J2EE**

  Can employ any number of tools.

  (Like NetBeans, Eclips,…)

- **.NET**

  Visual Studio.NET, single IDE for building an application.

Summary

- .NET Framework is a code execution platform – the environment which .NET programs run.
- .NET Framework consists of two primary parts.
  - Common Language Runtime and .NET Class Libraries.
- The **CLS** (Common Language Specification) allows different languages to interact seamlessly.
- The **CTS** (Common Type System) allows all languages to share base data types.

Summary

- .NET languages are compiled to MSIL by their respective compilers.
- MSIL code is compiled to machine code by the JIT compiler.
- All .NET languages have equal access to the FCL (Framework Class Library).
  - which is a rich set of classes for developing software.
- Base Class Library is set of basic classes.
  - Collections, I/O, Networking, Security, etc.
- ADO.NET provides .NET applications with access to relational databases

Summary

- .NET has great XML support .
- Windows Forms provides GUI interface for the .NET applications.
- ASP.NET allows creating web interface to .NET applications.
- Web Services expose functionality from web sites and make it remotely accessible through standard XML-based protocols.
- Visual Studio .NET is powerful development IDE for all .NET languages and technologies.

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For Research

What's new in .NET Framework 4.5?

Windows Presentation Foundation

- Built-in Ribbon controls ★
- Databinding improvements
- Ability to add breakpoints to databindings
- Data source change aware views (Live Shaping) ★
- Validation improvements A
- Improved legacy UI integration
- Dispatcher improvements A
- Speed-up of large data sets P

Windows 8 support ★

- Support for Windows Runtime (WinRT)
- .NET Profile for Metro-style apps
- Improved support for sharing DLLs between .NET profiles

ASP.NET

- ASP.NET Web API - a new framework for REST endpoints ★
- Support for implementing WebSocket receivers ★
- Built-in JavaScript + CSS combining and minification ★

ASP.NET MVC 4

- Async controllers A
- Built-in mobile templates + jQuery.Mobile support
- Alternate views (e.g. print version, mobile site)
- Support for Recipes: intelligent codegen ★

ASP.NET Web Pages 2

- New site templates
- Versatile validation support
- Support for OAuth and OpenID ★
- Built-in map embedding tools; supports Google, Bing and others

Did you know? ASP.NET Web Pages is yet another way to work the web besides Web Forms and MVC. WP sites use Razor and are typically developed with WebMatrix.

Web Forms

- Strongly typed data binding
- MVC-like support for Models ★
- HTML encoded binding expressions

HTML5 support ★

- Control support for new semantic elements
- Multifile support for FileUpload control
- Validator and UpdatePanel now support new HTML5 elements

Tooling

- Markup editors improved (a lot)
- IIS Express used by default
- Page Inspector ★
- New templates and snippets

- **Asynchronous pipeline support** A (Response, Request, HttpHandlers)
- **Performance improvements**: Multicore JIT, 35 % faster startup, memory optimizations, assembly sharing between sites, pre-fetch support P
- **Request validation improvements**: AntiXSS built-in, validation usable per field

Windows Communication Foundation

- New channels (UDP multicast, WebSockets, ...) ★
- Support for contract-first development ★
- Asynchronous operations A
- Streaming improvements
- Simplified configuration, VS config validation
- Multiple auth modes for HTTP endpoints
- New, simple HttpClient class

Windows Workflow Foundation

- C# Expressions
- State machine workflows are back! ★
- Workflow versioning ★
- Code-first activity design
- Faster execution P
- Designer usability improvements

Managed Extensibility Framework 2.0

- Support for generic parts ★
- Debugging improvements
- Support for explicit and convention-based bindings between objects ★
- Support for binding POCOs: no more attribute requirements

ADO.NET

- Sparse columns support improved (SQL Server)
- Passwords are now stored encrypted
- Asynchronous operations A

SQL Express LocalDB

New light version of SQL Express for developer use. Supported in .NET 4.5, separate patch for 4.0 is coming.

SQL Server 2012 ("Denali") Support

- High Availability support on connection string level
- Fast failover across multiple subnets
- Support for new spatial data types (polygons, arcs etc.) ★

Entity Framework 4.5

- Enumeration support
- Migrations for schema changes ★
- Designer improvements
- Spatial data type support ★
- Table-valued function support ★
- Multi-result sproc support
- Multiple diagrams per model
- Code-first support ★
- Auto-compiled LINQ queries P

Base Class Library

- Networking improvements (IPv6 enhanced, IDN, EAI etc.)
- Key interfaces (e.g. file IO) now support async A
- New ArraySegment and ReadOnlyDictionary classes
- Support for CLR objects over 2 GB in size
- Resource file management performance improved P
- Unicode improvements (v6, console support)
- Background JIT on multicore platforms P

Task Parallel Library A

- Task thread controls improved: Task.WaitAll/.WaitAny, various timeout primitives available
- TPL Dataflow: Tools for parallel data flow processing ★

C# 5.0

- Support for async programming: async and await keywords A
- Methods can access call site info as parameters (CallerInfo)

Visual Basic 11

- Iterator implementations (Yield)
- Async and Await equal to C# A
- "Global" keyword for namespace referencing
- Call Hierarchy view available
- CallerInfo attributes (as in C#)

F# 3.0

- Type providers ★
- Query expressions (LINQ) ★
- Auto-implemented properties

Visual C++ 11

- C++11 standard support improved
- Auto-vectorization and parallelization of loops A P
- GPU-driven processing (C++ AMP)
- Intellisense for C++/CLI

Legend:

A = Asynchrony support
P = Performance improvement
★ = Significant new feature

Microsoft tech·days Helsinki 2012

SANKO
Suomen Aktiivisten .NET-kehittäjien Kerho
www.facebook.com/sanko.net

offbeat solutions
www.offbeat.fi

Information based on public sources available updated on 1st March 2012 (.NET 4.5 beta).

Composed by Jouni Heikniemi.
Original with updates available @ www.heikniemi.net/hardcoded

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