.NET Framework

April 22, 2020

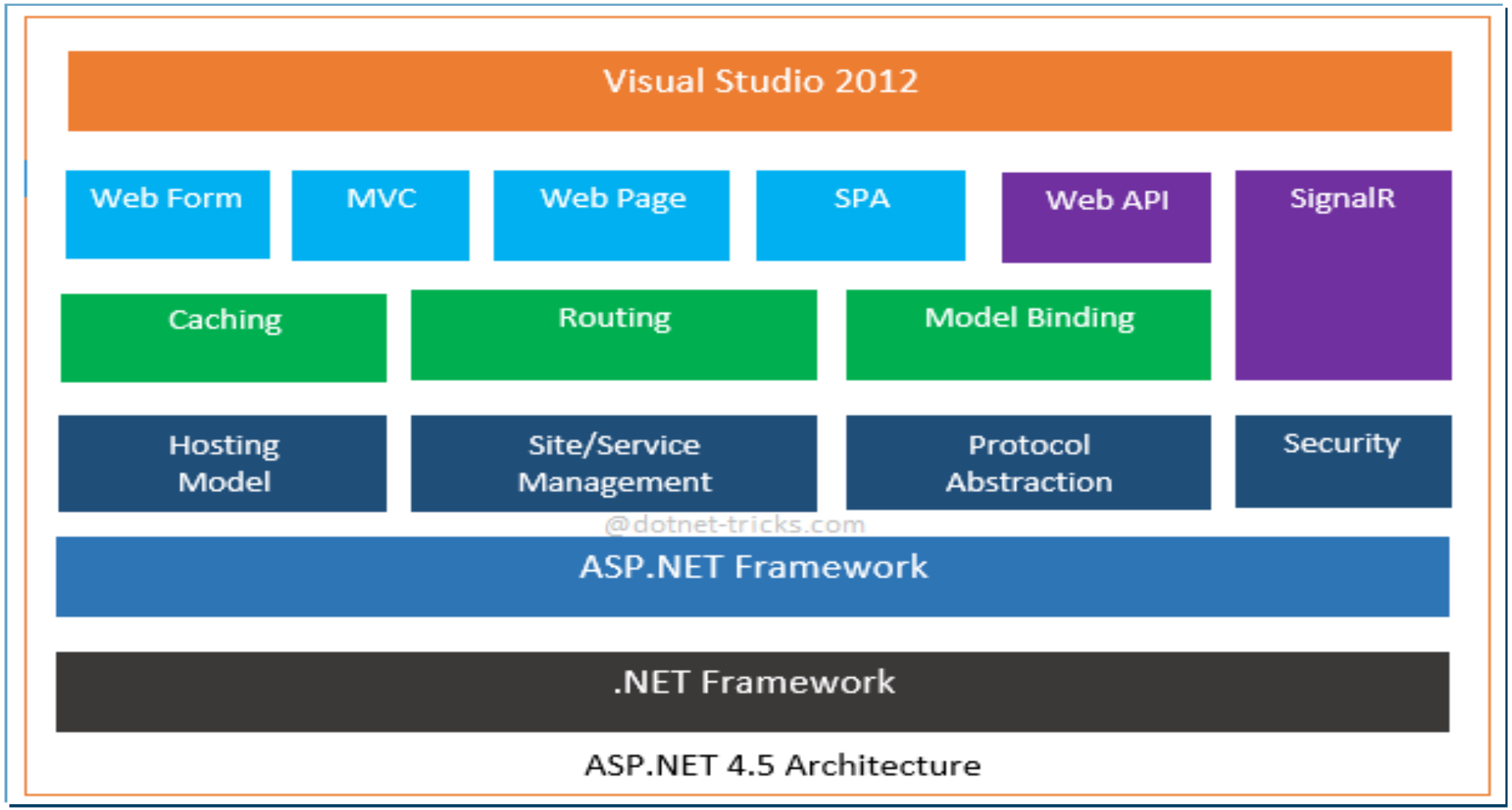
Objectives

- In this lesson, you will learn:
  - Introduction to .NET Framework
  - Basic concepts of .NET Framework
  - Assemblies

.NET Framework

- The .NET Framework is a technology that supports building, deploying and running the next generation of apps and XML Web services.
- The .NET framework is an execution and development platform for building apps for Windows, Windows Phone, Windows Server and Windows Azure.
- The .NET Framework is designed to fulfil the following objectives:
  - consistent object-oriented programming environment
  - code-execution environment that minimizes software deployment and versioning conflicts and safe execution of code.
  - build all communication on industry standards to ensure that code based on the .NET Framework integrates with any other code.

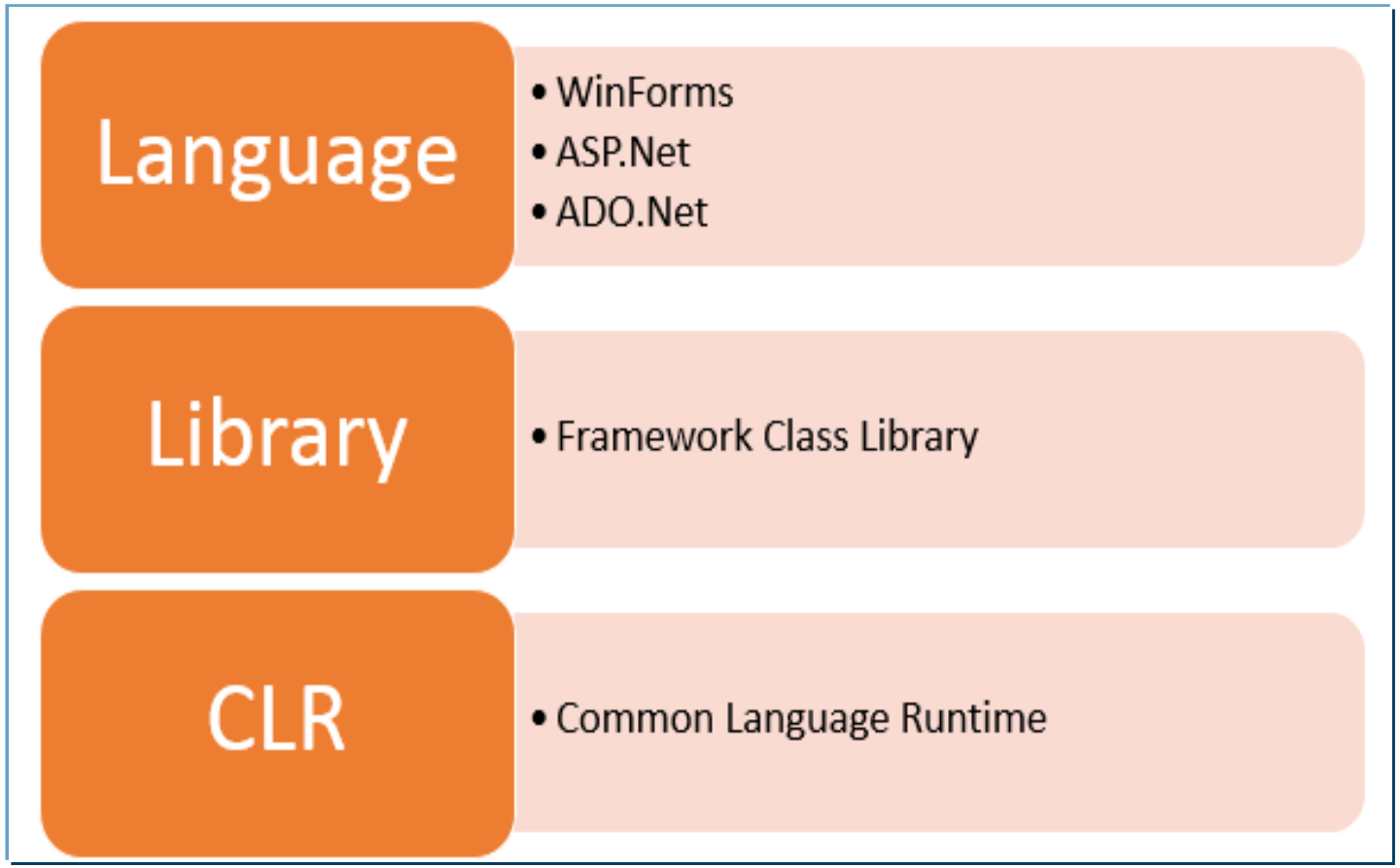
Framework Architecture



Types of applications

- Console Applications
- Windows Form Application
- Web Applications
- XML Web Services
- WCF Services
- WPF Applications
- Windows Store Applications
- Windows Services

Components of .NET Framework



.NET Framework Component - CLR

- CLR is runtime environment to execute .NET Apps. Commercial implementation of CLI by Microsoft.
  - Code Execution
  - Exception Handling
  - Resource Management
  - Garbage Collection
  - Just In Time Compilation
  - Code Access Security
  - Language Interoperability
  - Application Isolation
- CLI – Common Language Infrastructure is an international standard that is the basis for creating execution and development environments in which languages and libraries work together seamlessly.

.NET Framework Component - CLR

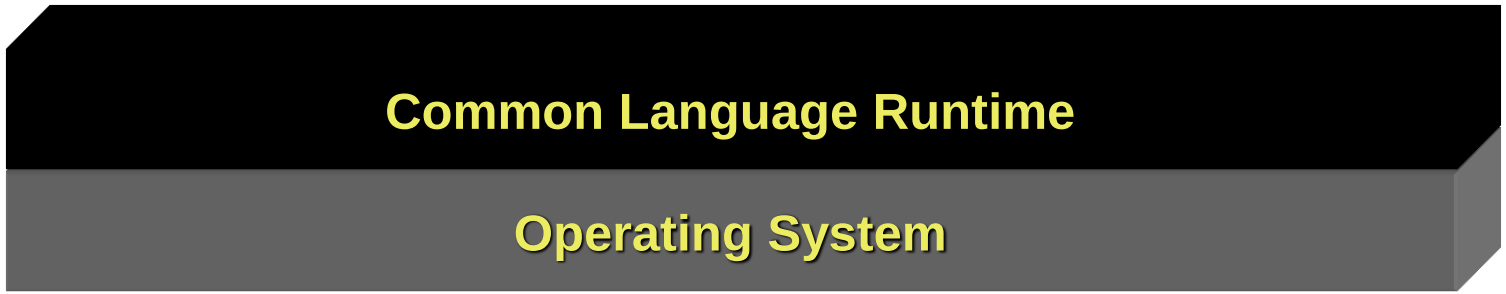
- **JIT Just-in-Time** compiler compiles CIL to Machine Code. Compiles portion of code as it is called and it is cached.
- **CLS Common Language Specification** is a set of standards that all compilers targeting .NET must support. CLS work with CTS to ensure language interoperability.
- **CTS Common Type System** defines the set predefined data types available in it.
- **CAS Code Access Security** applies the permission to code, based on source of code and other identities.
- **GC Garbage Collection** manages allocation and deallocation of objects in memory.

.NET Framework Component - FCL

- FCL Framework Class Library
- The .NET Framework class library is a collection of reusable types that tightly integrate with the common language runtime.
- The class library is object oriented, providing types from which your own managed code derives functionality
- Consists of classes, interfaces, and structures, delegates etc.
- Library of tested, reusable code that developers can use in own applications
- are categorized using namespaces.

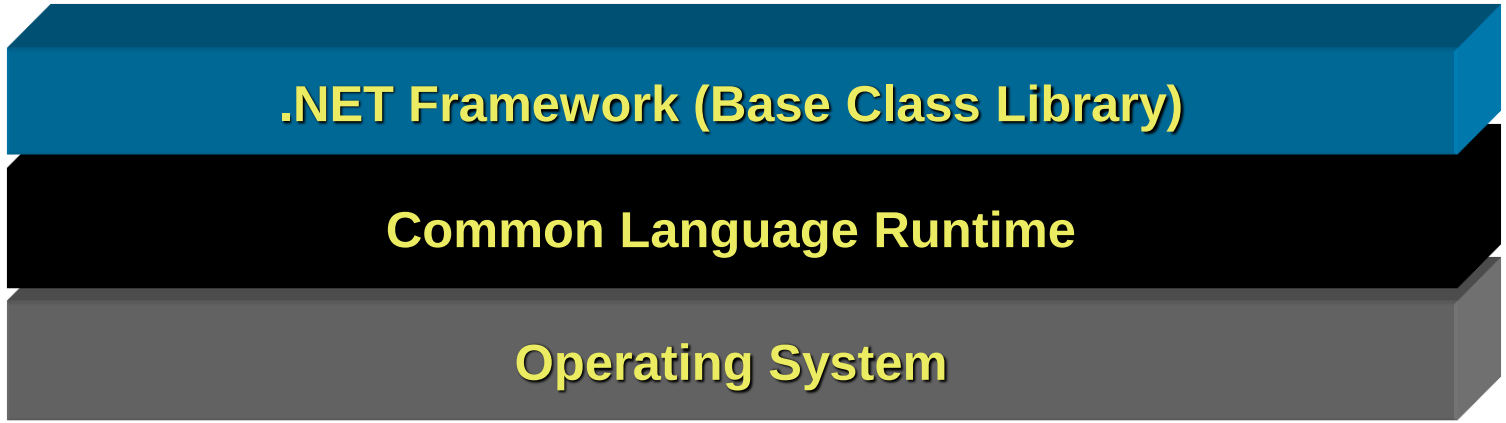
.NET Framework
Common Language Runtime

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



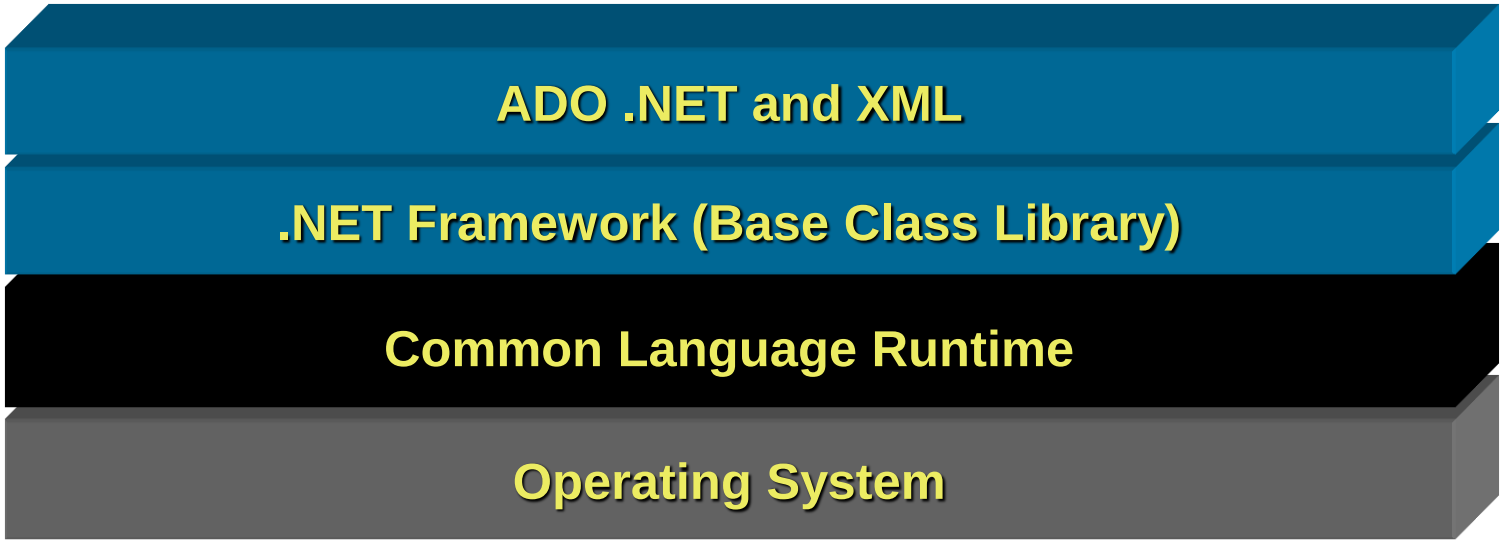
.NET Framework
Base Class Library

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



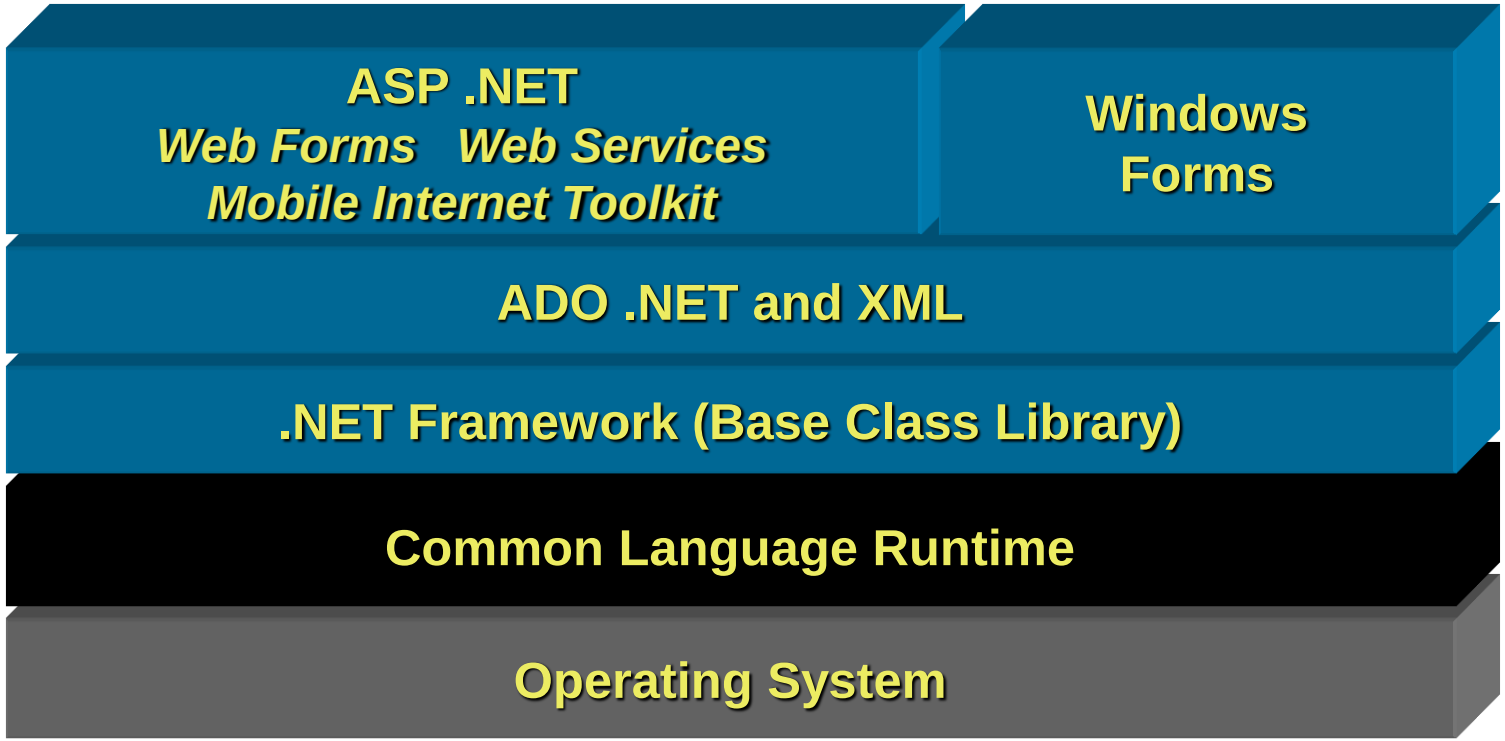
.NET Framework
Data Access Layer

- Access relational databases
- Disconnected data model
- Work with XML



.NET Framework
ASP.NET & Windows Forms

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



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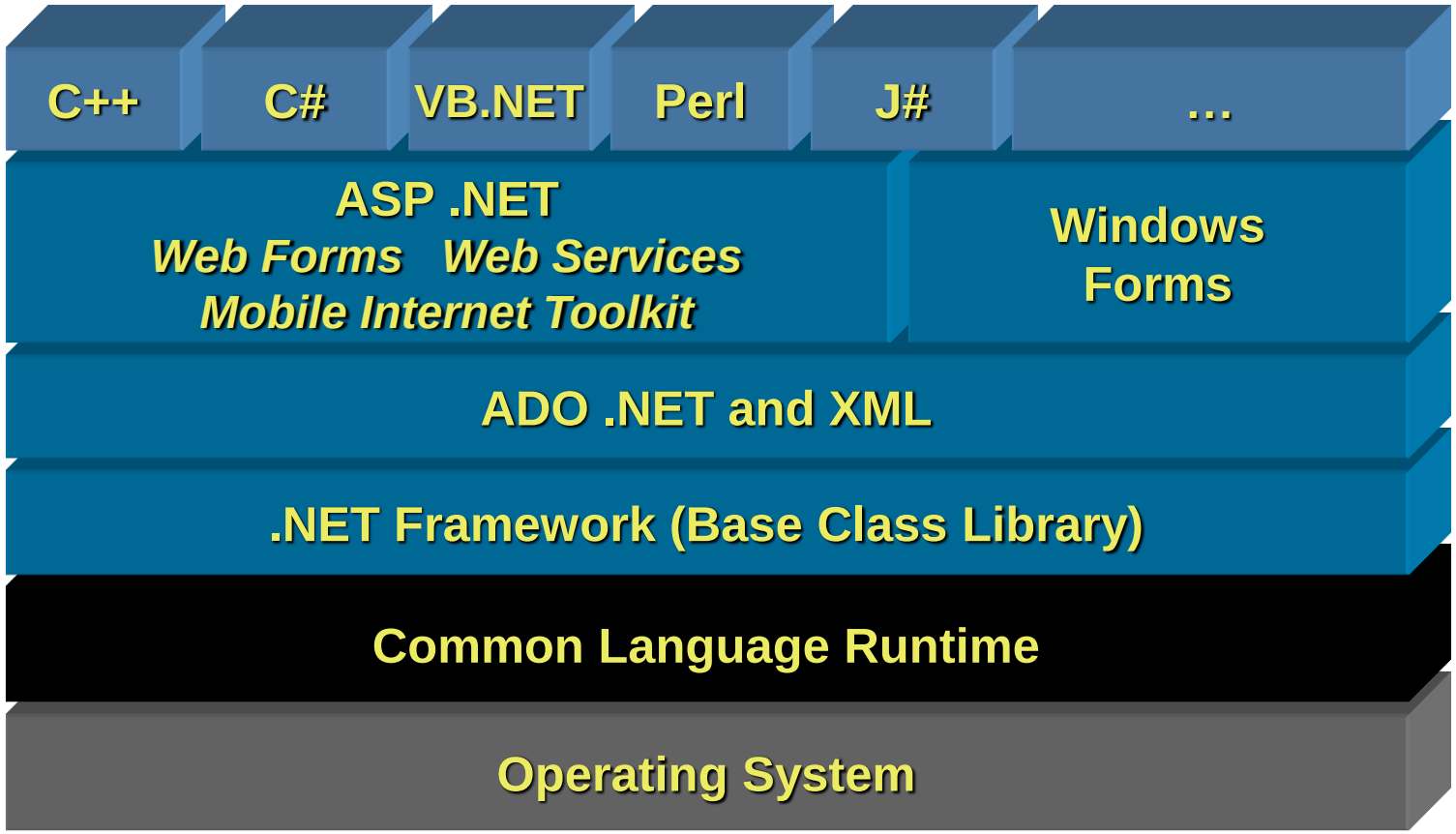
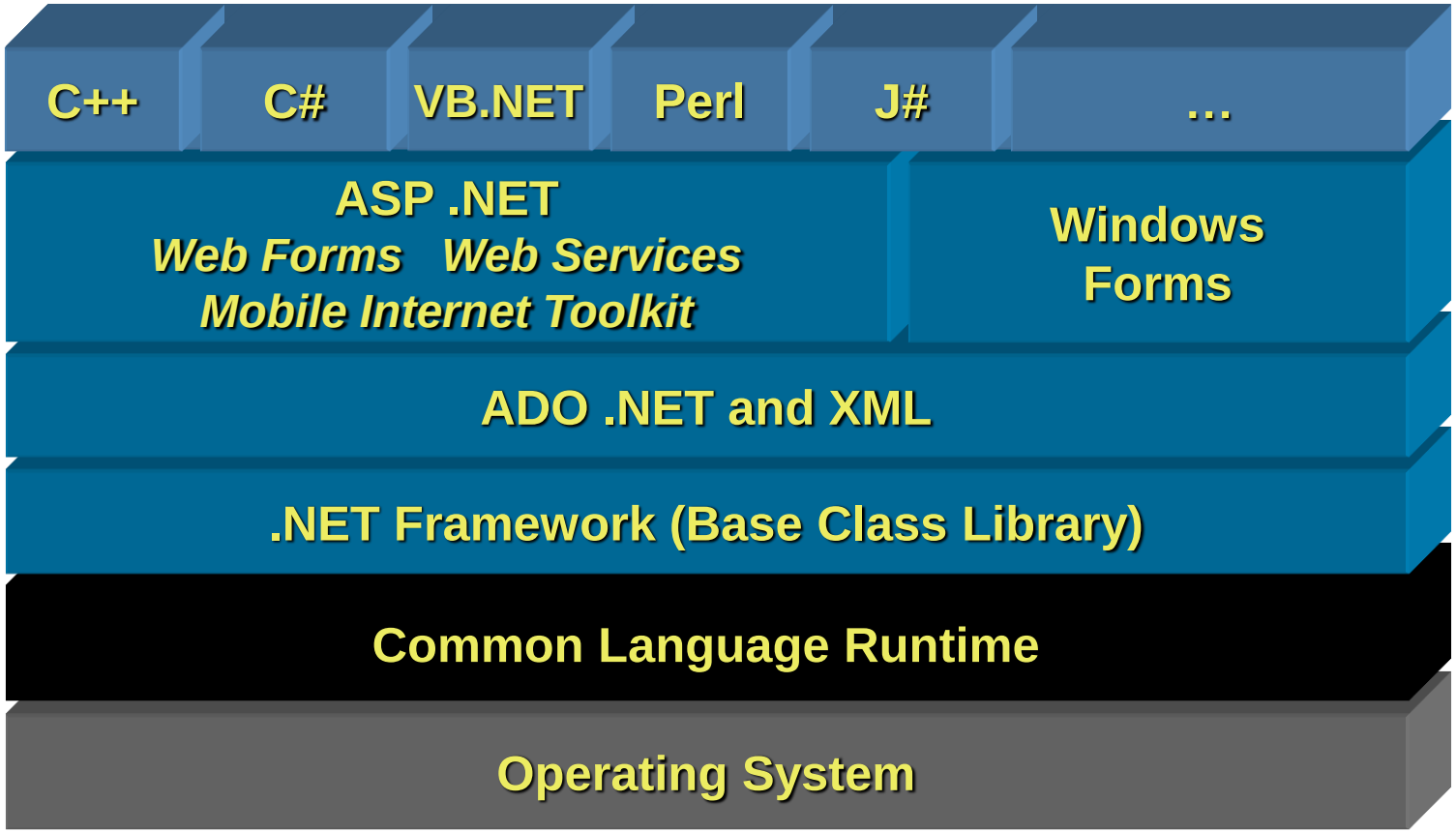
.NET Framework
Programming Languages

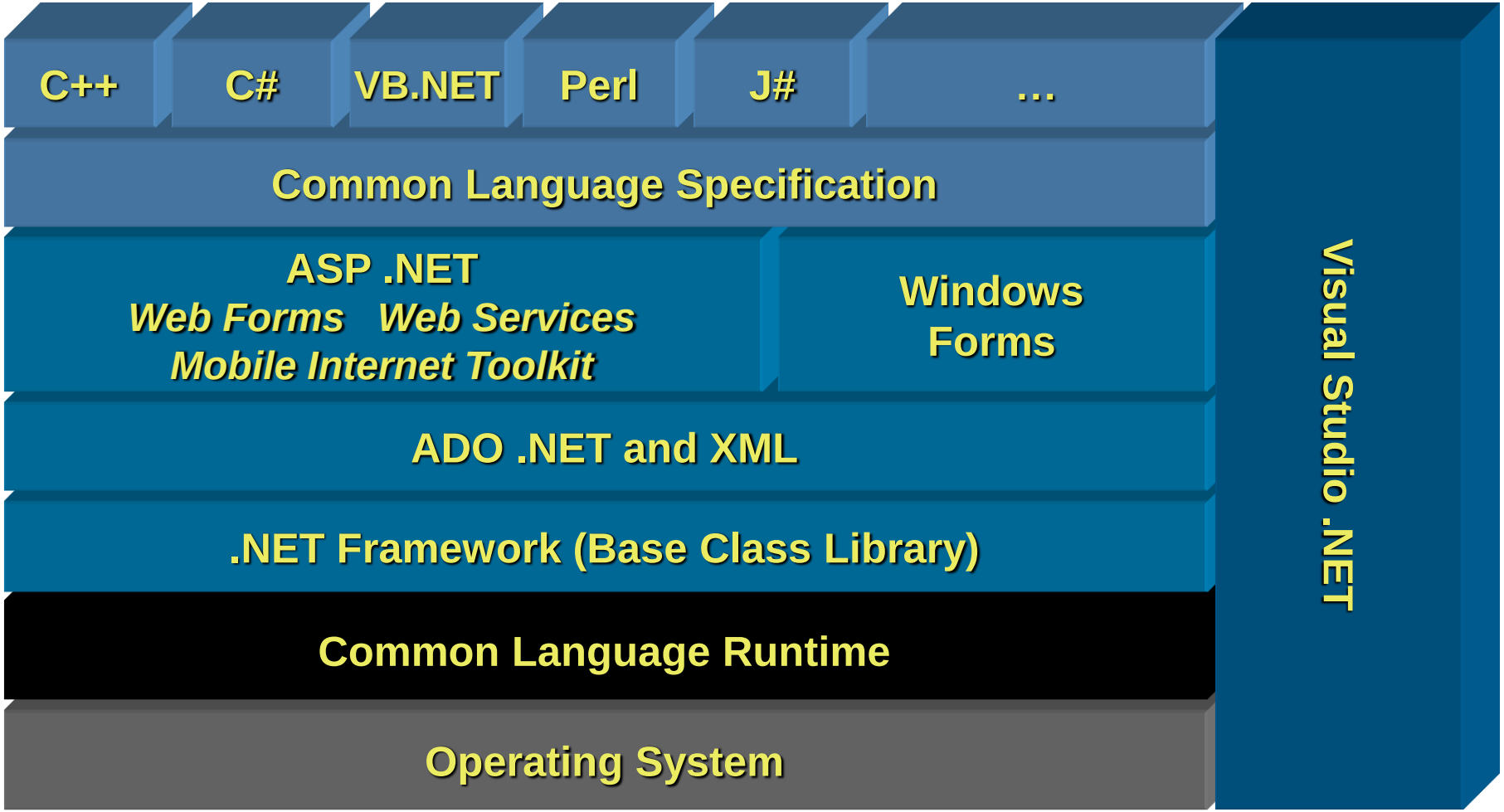
- Use your favorite language



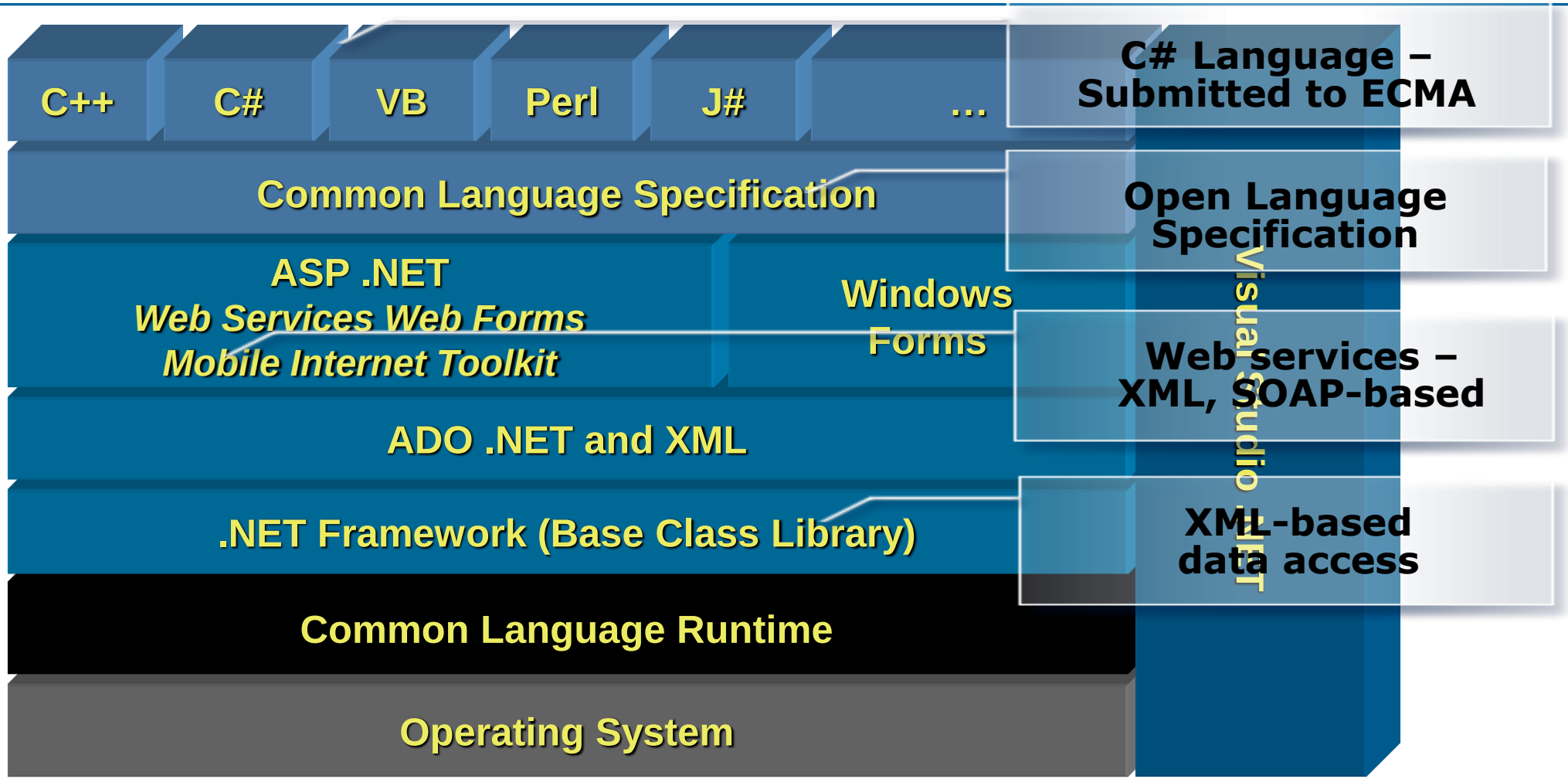
.NET Framework
Common Language Specification



.NET Framework
Visual Studio .NET



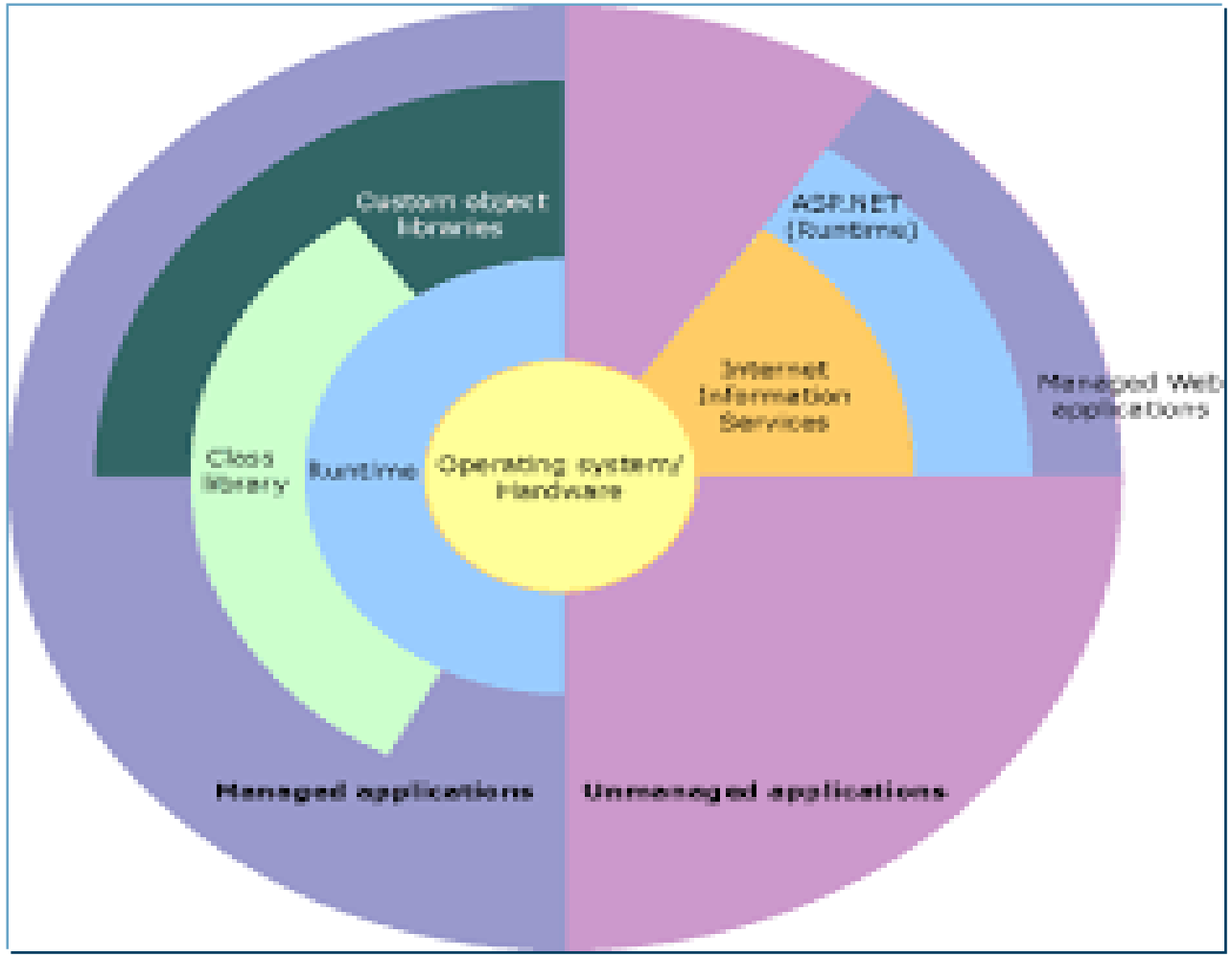
.NET Framework
Standards Compliance



.NET Languages

- Languages provided by Microsoft
  - C++, C#, J#, VB.NET, JScript
- Third-parties languages
  - Perl, Python, Pascal, APL, COBOL, Eiffel, Haskell, ML, Oberon, Scheme, Smalltalk…
- Advanced multi-language features
- Cross-language inheritance and exceptions handling
- Object system is built in, not bolted on
- No additional rules or API to learn

.NET Framework Overview



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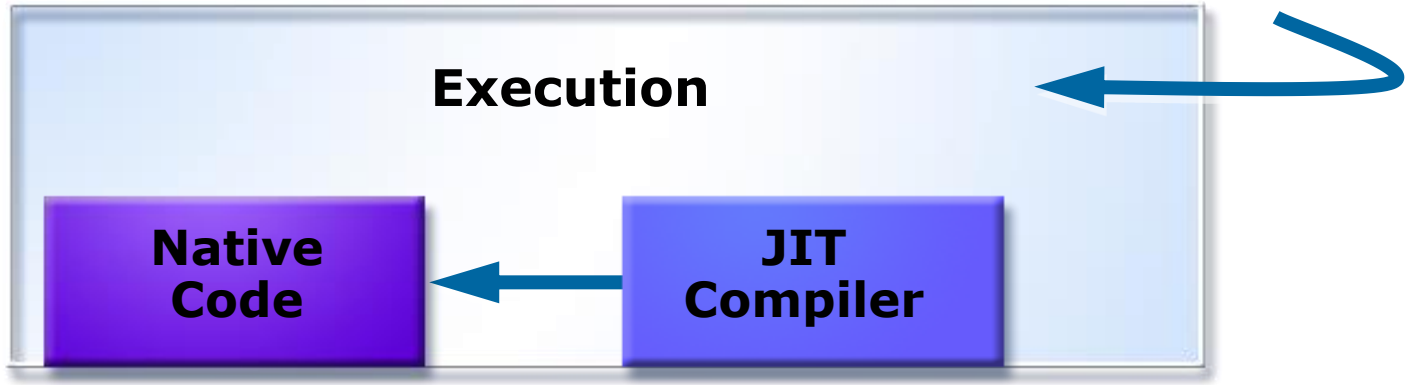
Code Compilation and Execution

Also called Assembly (.EXE or .DLL file)



Before installation or the first time each method is called

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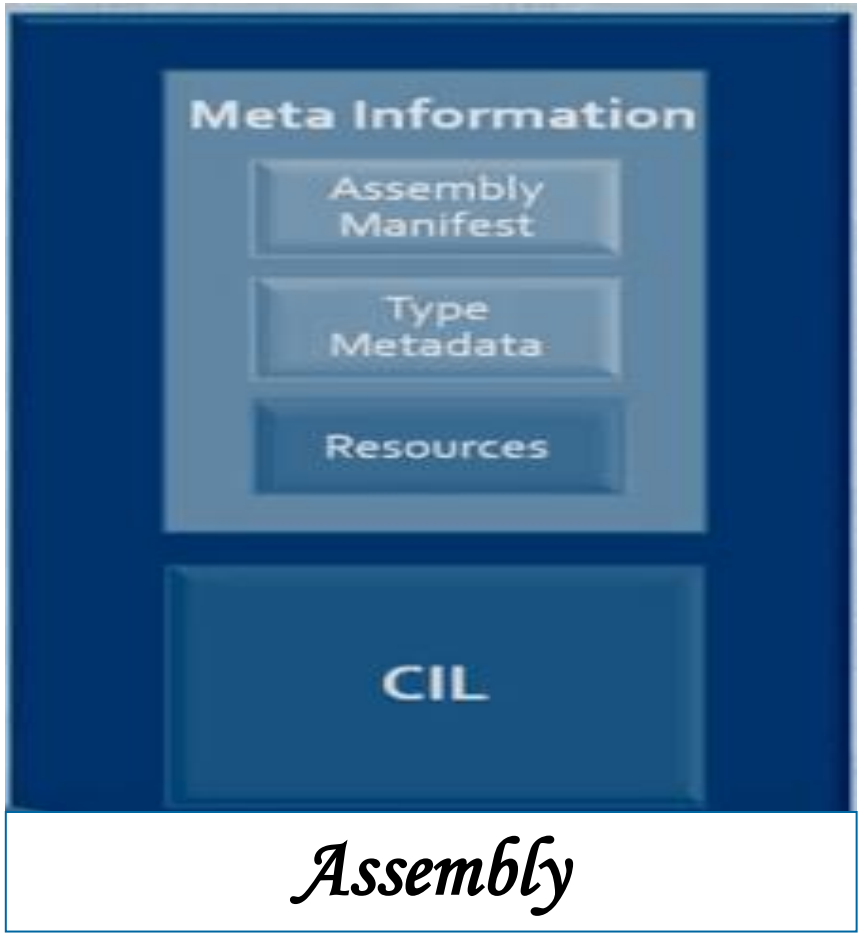
Assemblies

- DLL or EXE file
- Smallest deployable unit in the CLR
- Have unique version number
- No version conflicts (known as DLL hell)
- Contains IL code to be executed
- Security boundary – permissions are granted at the assembly level
- Type boundary – all types include the assembly name they are a part of
- Self-describing manifest – metadata that describes the types in the assembly

Assemblies



- An assembly is the smallest deployable unit of execution.
- It is the basic building block of .NET Framework.
- It Consists of Meta-Information and CIL
- It is Self Descriptive
- There are two types of assemblies
  - Private
  - Public

Test you memory..

- Why .NET framework is termed as Language independent ?
- What are the main features of CLR?
- What is namespace?
- What is Assembly?

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

Recap

- .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.
- .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

Recap

- Base Class Library is set of basic classes: Collections, I/O, Networking, Security, etc.
- ADO.NET provides .NET applications with access to relational databases.
- NET has great XML support including: DOM, XSLT, XPath, and XSchema
- 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

Thank You

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