

.NET Framework

What is?

- A software framework
- Developed by Microsoft
- Runs primarily on Microsoft Windows
- Includes a large class library
- Framework Class Library (FCL)
- Provides language interoperability
- Each language can use code written in other languages

- Several programming languages
- Initial release February 13, 2002; 16 years ago
- Stable release 4.7.2 / April 30, 2018; 4 months ago

CLR

- Programs written for .NET Framework execute in a software environment (in contrast to a hardware environment) named Common Language Runtime (CLR)
- Application virtual machine that provides services
- Security
- Memory management

- Exception handling
- Computer code written using .NET Framework is called "managed code"
- FCL and CLR together constitute .NET Framework.

Class library

- Standard class libraries
- Organized in a hierarchy of namespaces
- Application programming interfaces (APIs) are part of either `System.*` or `Microsoft.*` namespaces.
- File reading and writing, graphic rendering, database interaction, and XML document manipulation

- Divided into two parts
 - Base Class Library (BCL)
 - Framework Class Library (FCL)

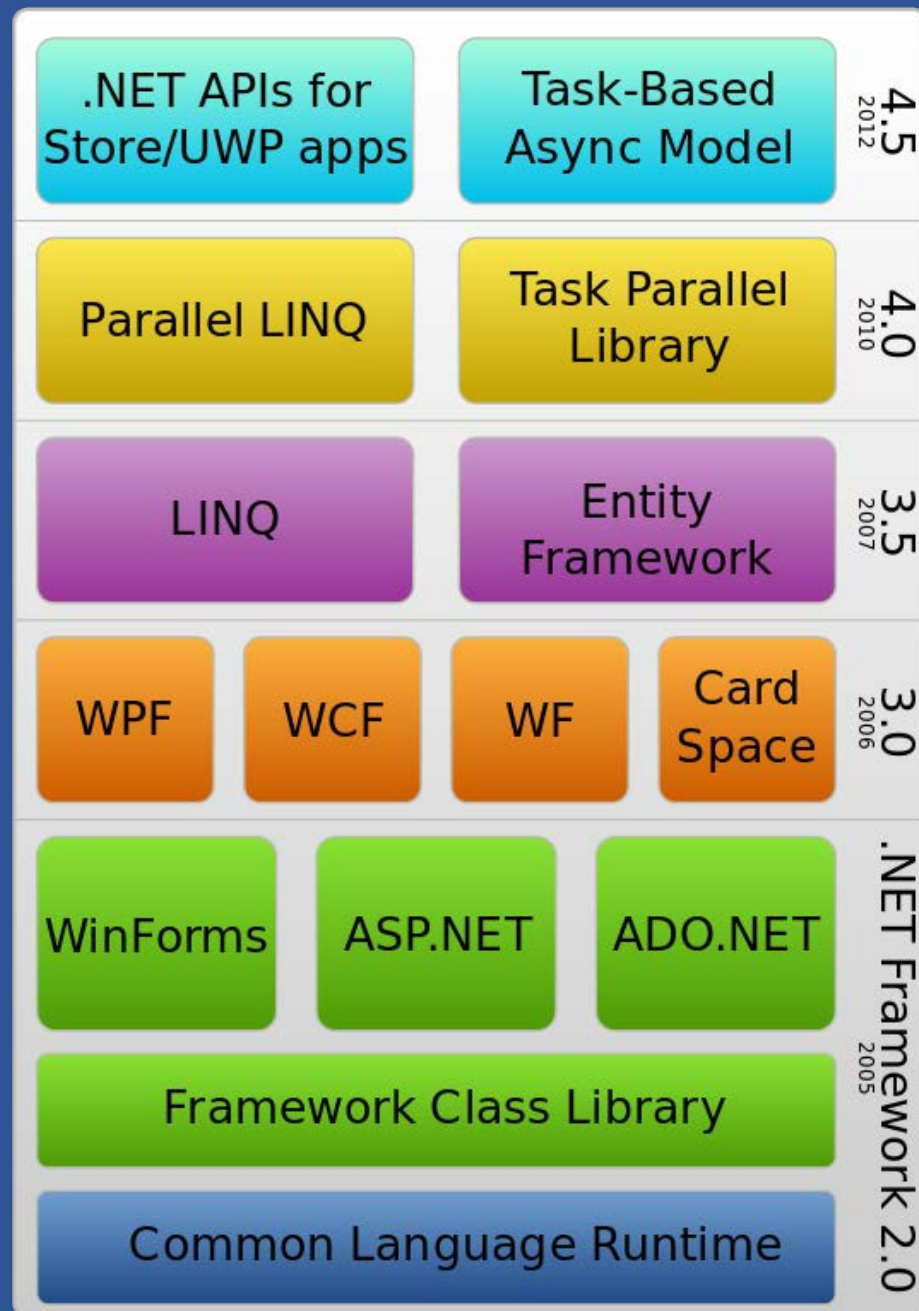
Base Class Library (BCL)

- Small subset of the entire class library
- Core set of classes that serve as the basic API
- Reside in mscorlib.dll, System.dll and System.Core.dll
- Available in .NET Framework, .NET Compact Framework, Microsoft Silverlight, .NET Core and Mono

Framework Class Library (FCL)

- User interface
- Data access
- Database connectivity
- Cryptography
- Web application development
- Numeric algorithms
- Network communications

.NET Framework component stack



Common Language Infrastructure (CLI)

- Provides a language-neutral platform for application development and execution
- By implementing the core aspects of .NET Framework within the scope of CLI
- These functions will not be tied to one language but will be available across the many languages supported by the framework

Common Language Runtime (CLR)

- Serves as the execution engine
- Memory management
- Type safety
- Exception handling
- Garbage collection
- Security
- Thread management

Common Intermediate Language code (CIL)

- All programs written for .NET Framework are executed by the CLR
- All program compiled into CIL
- just-in-time compiler (JIT) turns the CIL code into machine code.

Assemblies

- Compiled CIL code is stored in CLI assemblies
- Stored in Portable Executable (PE) file format
- dynamic-link library (DLL) and executable EXE files
- Each assembly consists of one or more files
- Must contain a manifest bearing the metadata for the assembly

The complete name

- Is meta data in manifest
- Not to be confused with the file name on disk
- Simple text name
- Version number
- Culture
- Public key token
- Assemblies are considered equivalent if they share the same complete name

Windows Forms

- Is a graphical (GUI) class library
- Part of Microsoft .NET Framework
- Write rich client applications for desktop
- Replacement for the earlier and more complex C++ based Microsoft Foundation Class Library

ASP.NET

- part of .NET Framework
- Open-source server-side web application framework
- Designed for web development
- Build web sites, web applications and web services.
- ASP.NET's successor is ASP.NET Core

Windows Presentation Foundation (WPF)

- Graphical subsystem
- Rendering user interfaces
- Uses DirectX
- Consistent programming model
- Separates the user interface from business logic
- Employs XAML

Windows Communication Foundation (WCF)

- Framework for building service-oriented applications
- Send data as asynchronous messages from one service endpoint to another
- The messages can be as simple as a single character or complex as a stream of binary data
- A secure service to process business transactions.

Language Integrated Query (LINQ)

- Framework component
- Adds native data querying capabilities to .NET languages
- LINQ extends the language by the addition of query expressions
- Akin to SQL statements

- Can be used with
 - Arrays
 - Enumerable classes
 - XML documents
 - Relational databases
 - Third-party data sources.

ADO.NET

- Data access technology
- Provides communication between relational and non-relational
- Software components
- Access data and data services from a database
- Evolution of ActiveX Data Objects (ADO)

Entity Framework (EF)

- Open source Object-relational mapping (ORM) framework for ADO.NET
- A part of .NET Framework
- Version 6 it is separated from .NET framework