Universitas Esa Unggul

Smart, Creative and Entrepreneurial

CMJ251-Manajemen Jaringan Mobile

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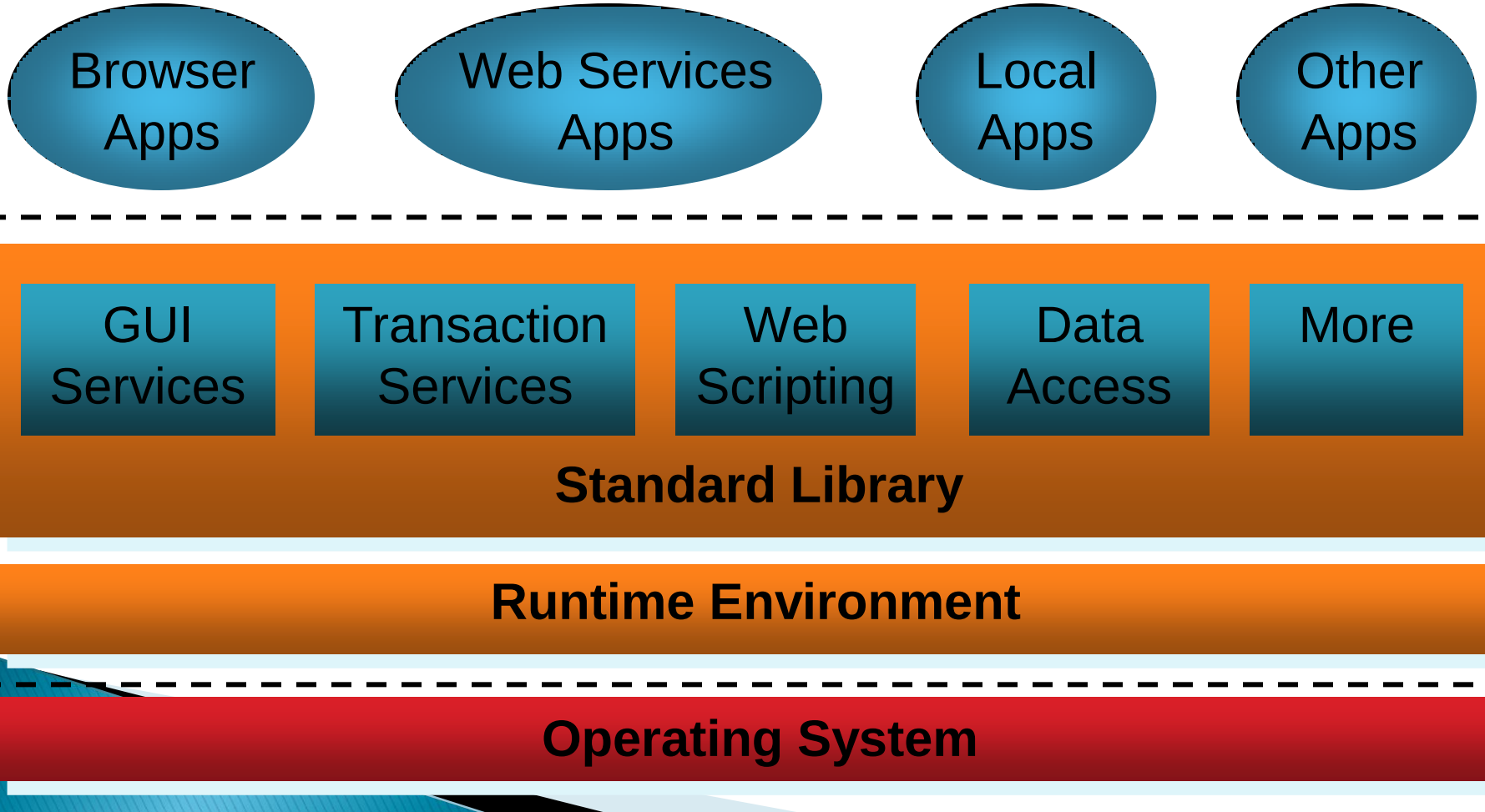
Prodi Teknik Informatika Fakultas Ilmu Komputer

Universitas Esa Unggul

.NET Compact Framework

Application Platforms Today



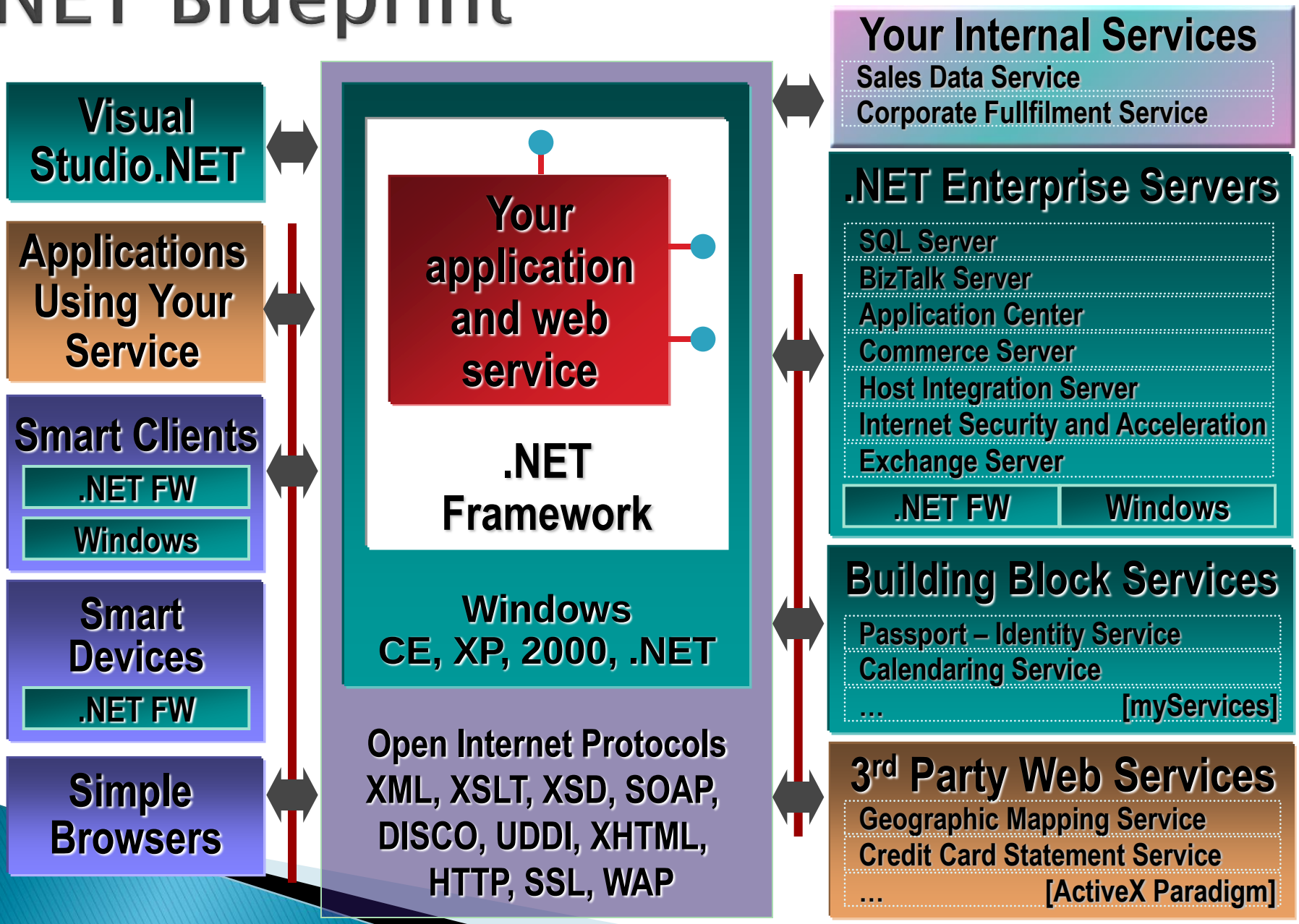
What is Microsoft .Net?

- Visi:
  - The platform for the **digital future**
  - '.NET is Microsoft's platform for a new computing model built around XML Web Services'
    Microsoft Corporation Annual Report, 2001
- Suatu brand name
  - Applied to many things
- Diperkenalkan oleh Microsoft pada (Juni 2000)
  - Sekarang sudah sampai .net framework 3.5

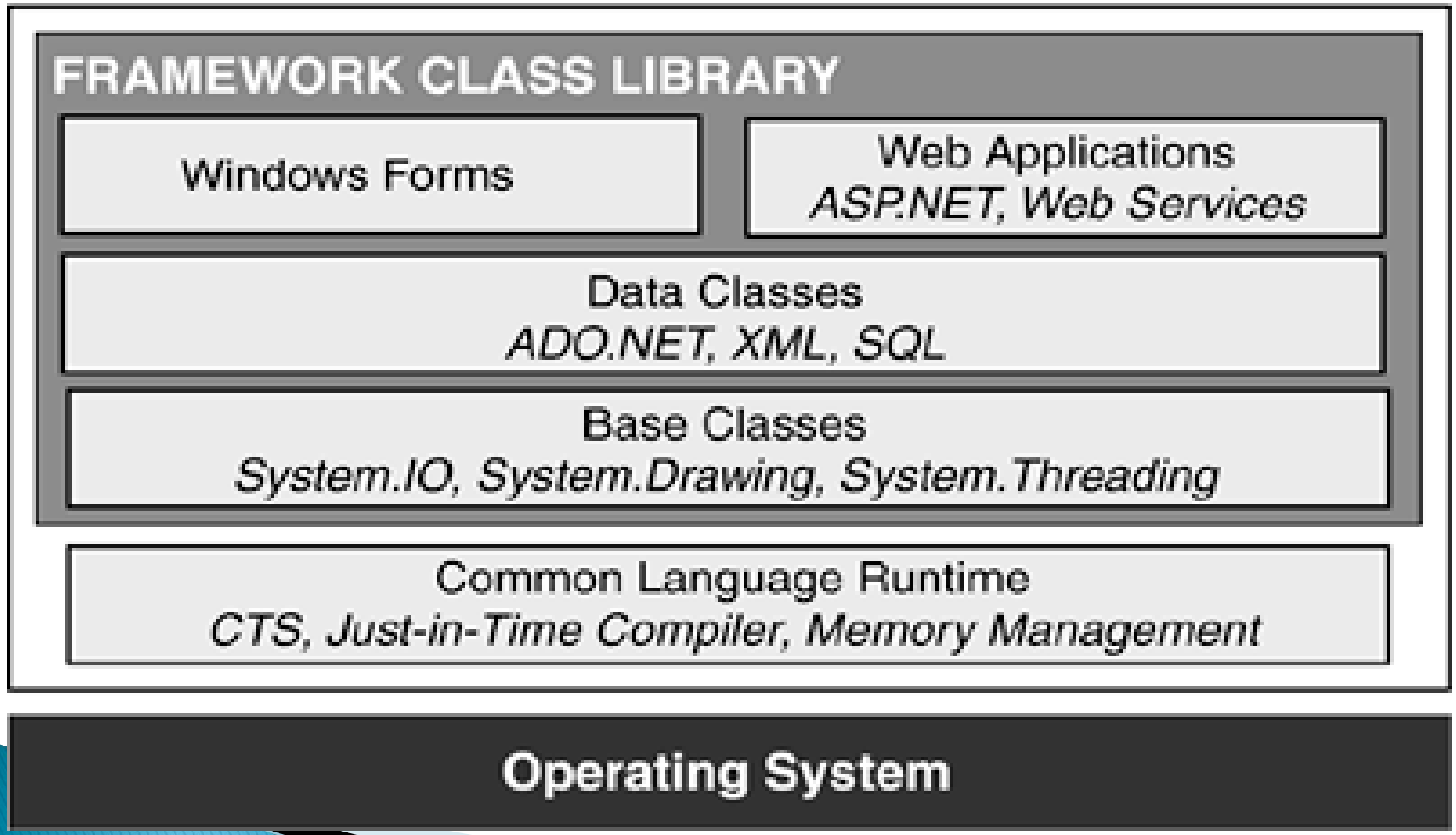
.NET FRAMEWORK

- Bersifat independen dalam hal bahasa
  - Aplikasi dapat dikembangkan di beberapa bahasa yang didukung oleh .NET: Visual Basic .NET, Visual C++ .NET, C# dan J#
  - Programmer dapat memilih salah satu bahasa yang paling dikuasainya.
- Mampu dijalankan di semua platform

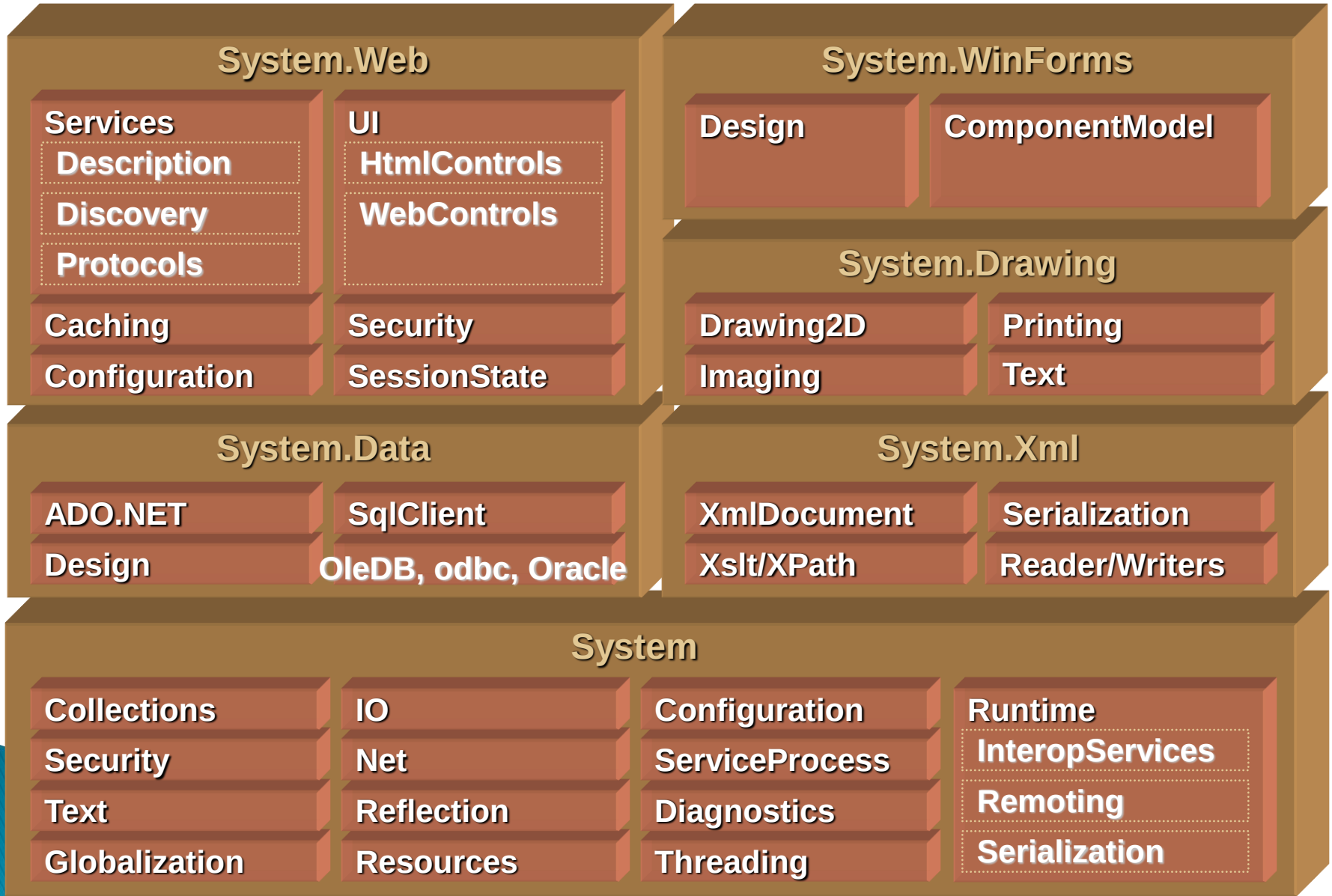
.NET Blueprint



.NET Framework (2)



.NET Framework (3)



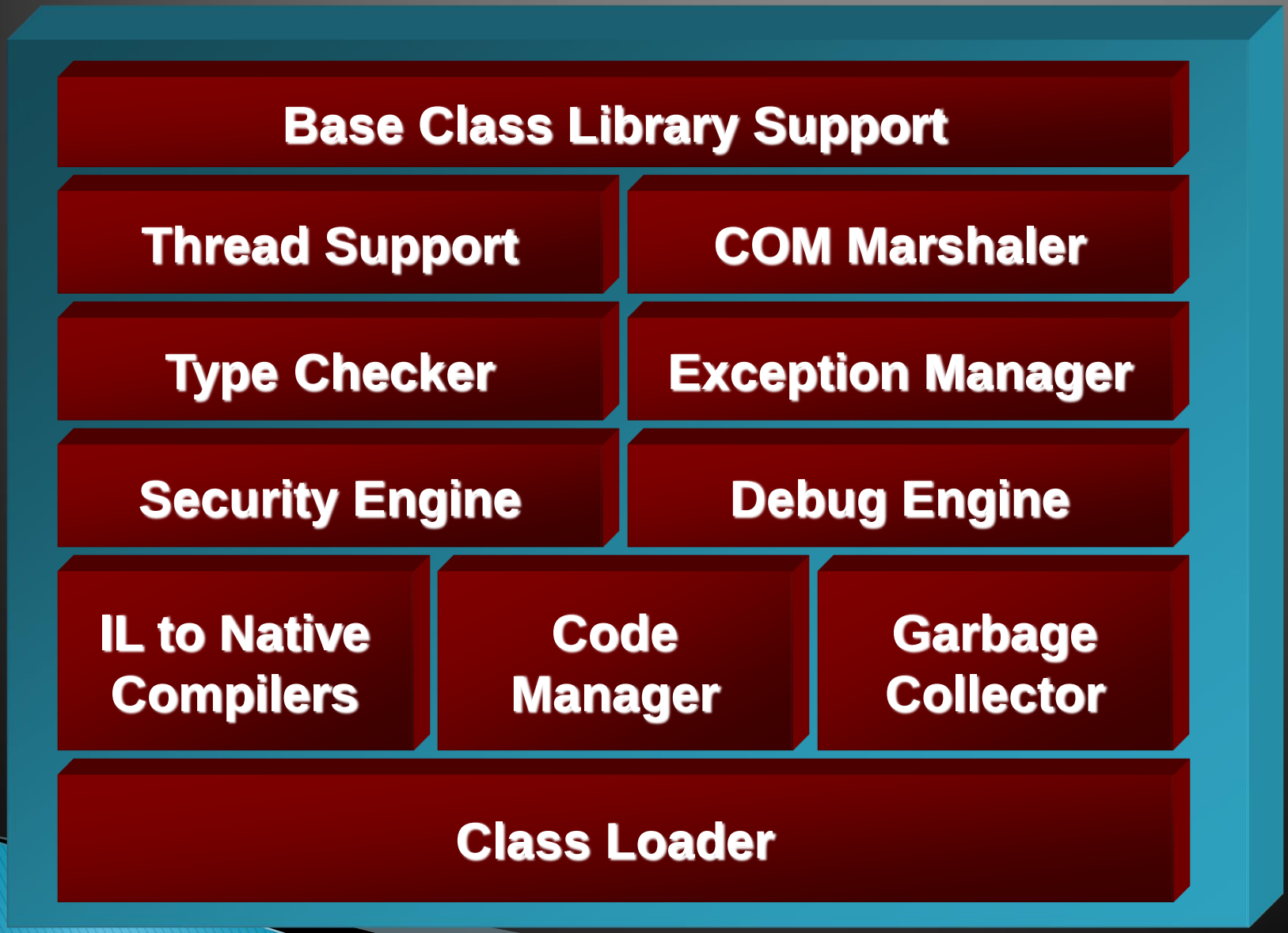
Common Language Runtime

- Bagian utama dari framework yang akan mengkompilasi dan mengeksekusi program yang ditulis dengan bahasa yang mendukung .NET
- Compilation process
  - Dua Langkah Kompilasi
    - Pertama program di compile menjadi Microsoft Intermediate Language (MSIL) / Common Intermediate Language (CIL)
      - Mendefinisikan instruksi untuk CLR
    - Kemudian MSIL code diterjemahkan kedalam machine code
      - Machine code untuk platform yang khusus
  - Mengapa dua proses kompilasi ?
    - Agar platformnya bersifat independence
      - .NET Framework dapat diinstal di platform berbeda
      - Mengeksekusi program .NET tanpa modifikasi kode-nya
    - Language independence
      - .NET program tidak terikat dengan bahasa tertentu
      - Komponen yang lama dan baru dapat terintegrasi

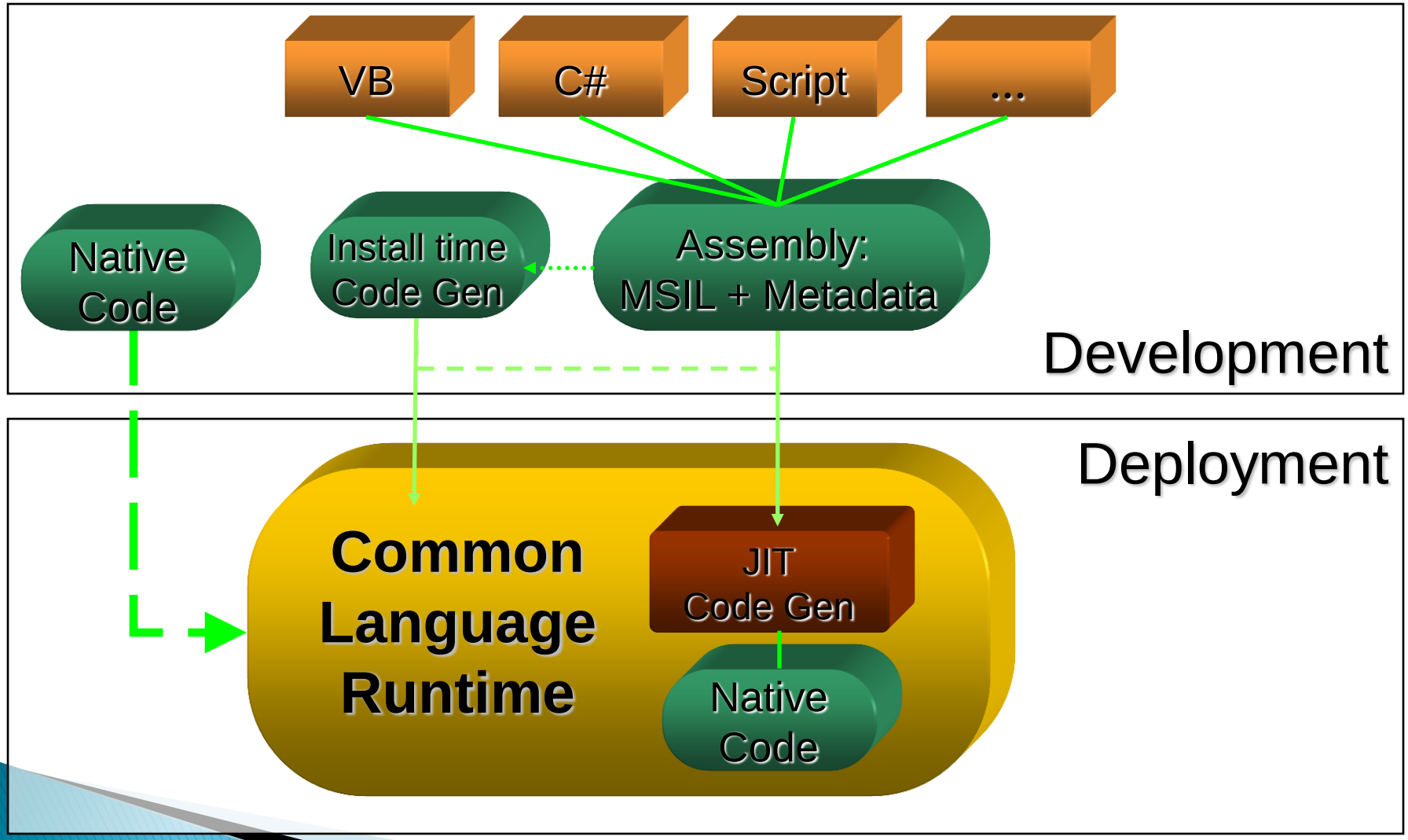
Common Language Runtime (2)

- Keuntungan lain dari CLR
  - Execution-management features
    - Manages memory, security
    - Membebaskan programmer dari banyak tanggung jawab
    - Programmer lebih berkonsentrasi pada program logic
- CLR menyediakan JIT compilation.
- JIT hanya akan mengkompilasi method-method yang memang digunakan dalam **suatu bagian** aplikasi pada saat tertentu, dan hasil kompilasi ini sendiri di *cache* di dalam mesin dan akan dikompile kembali jika memang ada perubahan pada kode aplikasi kita.
  - Jadi tidak semua method diload ke-memori pada saat yang sama

Common Language Runtime (3)



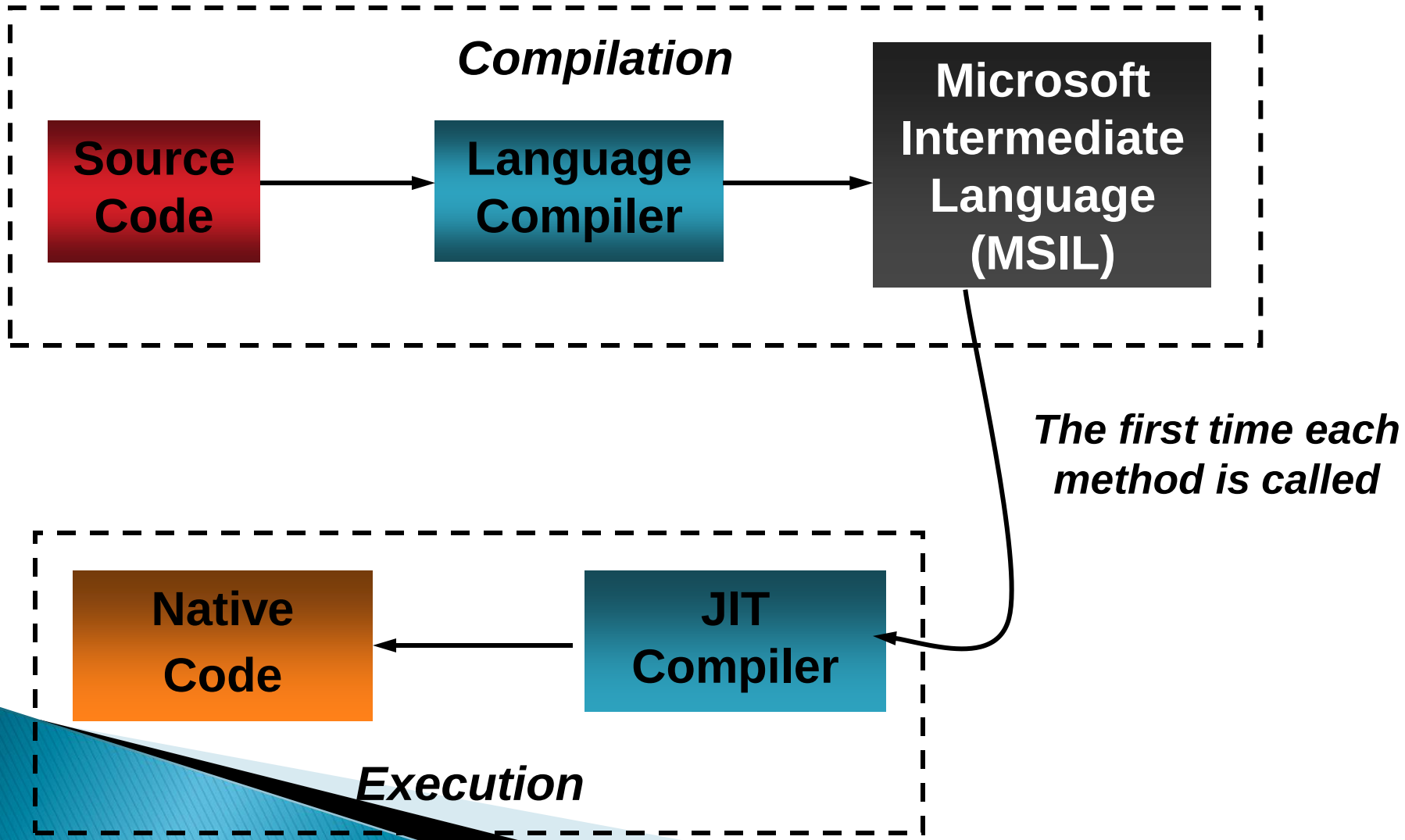
CLR Execution Model



Data Types in the CLR

- The CLR mendefinisikan Common Type System (CTS)
  - All languages built on the CLR use the CTS (managed code)
- Ada 2 kategori:
  - Value types:
    - Relatively simple types
    - Allocated on the stack
  - Reference types:
    - More complex types
    - Allocated on the heap
    - Destroyed through garbage collection

Compiling & Executing Managed Code



.NET Class Library

- Sering disebut sebagai Base Class Library.
- Adalah koleksi dari *reusable types* yang sangat terintegrasi secara melekat dengan CLR.
- *Class library* bersifat berorientasi objek yang akan menyediakan *types* dari fungsi-fungsi *managed code*.
- Dengan BCL kita dapat membuat:
  - Aplikasi *console*
  - Aplikasi berbasis windowd (*Windows Form*)
  - Aplikasi ASP.NET (berbasis web)
  - Aplikasi Web Services XML
- Aplikasi berbasis *Windows Services*

A Brief History of Windows Mobile Development

- Embedded Tools for Visual Studio
  - VS 6
  - Tools for VB, C++
- eMBedded Tools
  - Standalone and free
  - eVB
  - eC++
- .NET Compact Framework (First Pass)
  - Visual Studio.NET
  - Smart Device Extensions

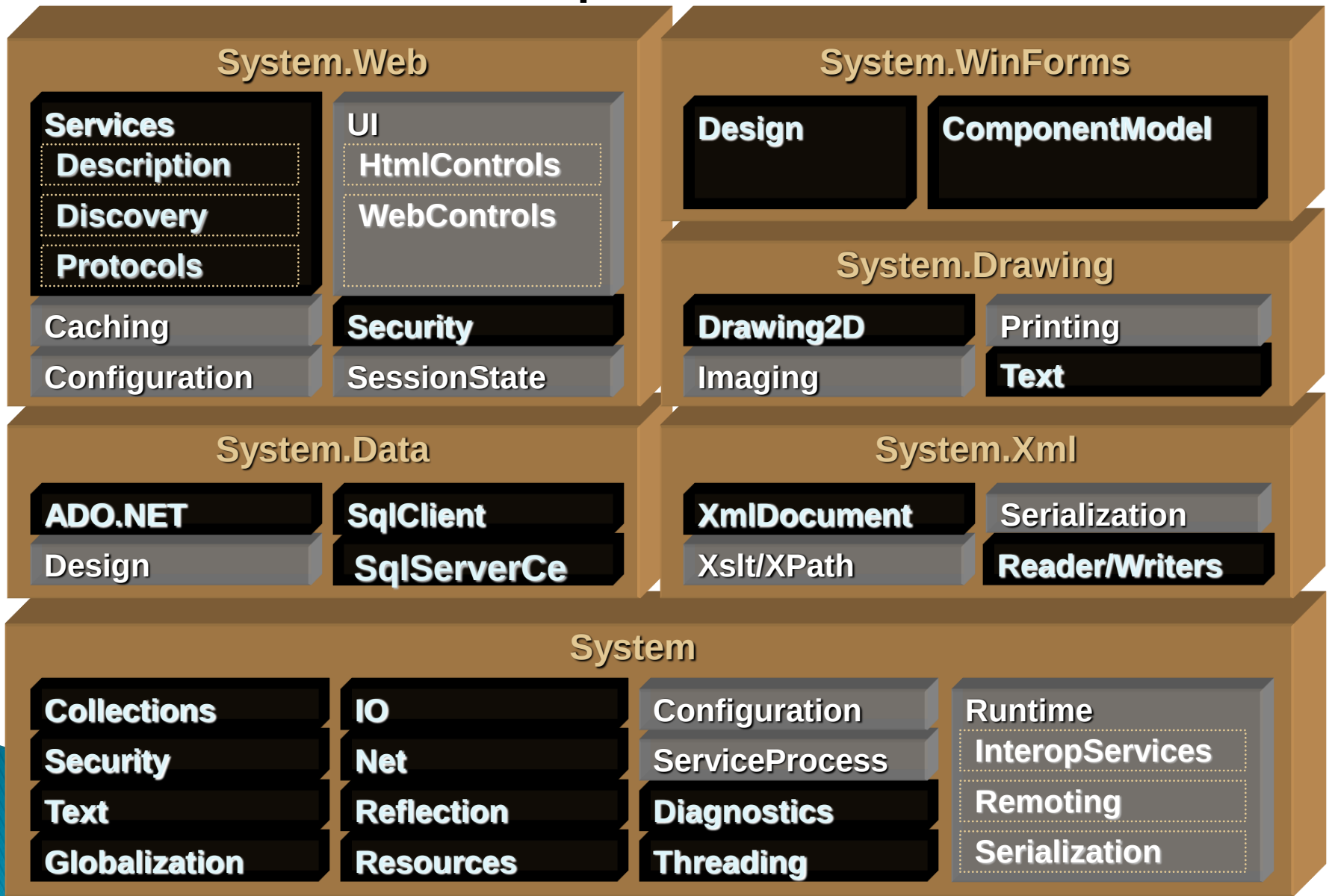
.NET Compact Framework Design Goals

- Portable and small .NET CLR for devices
  - Enable Visual Basic® and C#
- Integrated in Visual Studio® .NET
  - Run managed .EXEs and .DLLs directly
  - Debug with Visual Studio .NET
- Target devices:
  - Compaq, HP, Dell, Toshiba, …
  - PocketPC 2000, 2002
  - Windows Mobile (alias PPC 2003)
    - .Net CF in ROM!
  - Windows CE
  - SmartPhone
  - No Palm/Handspring

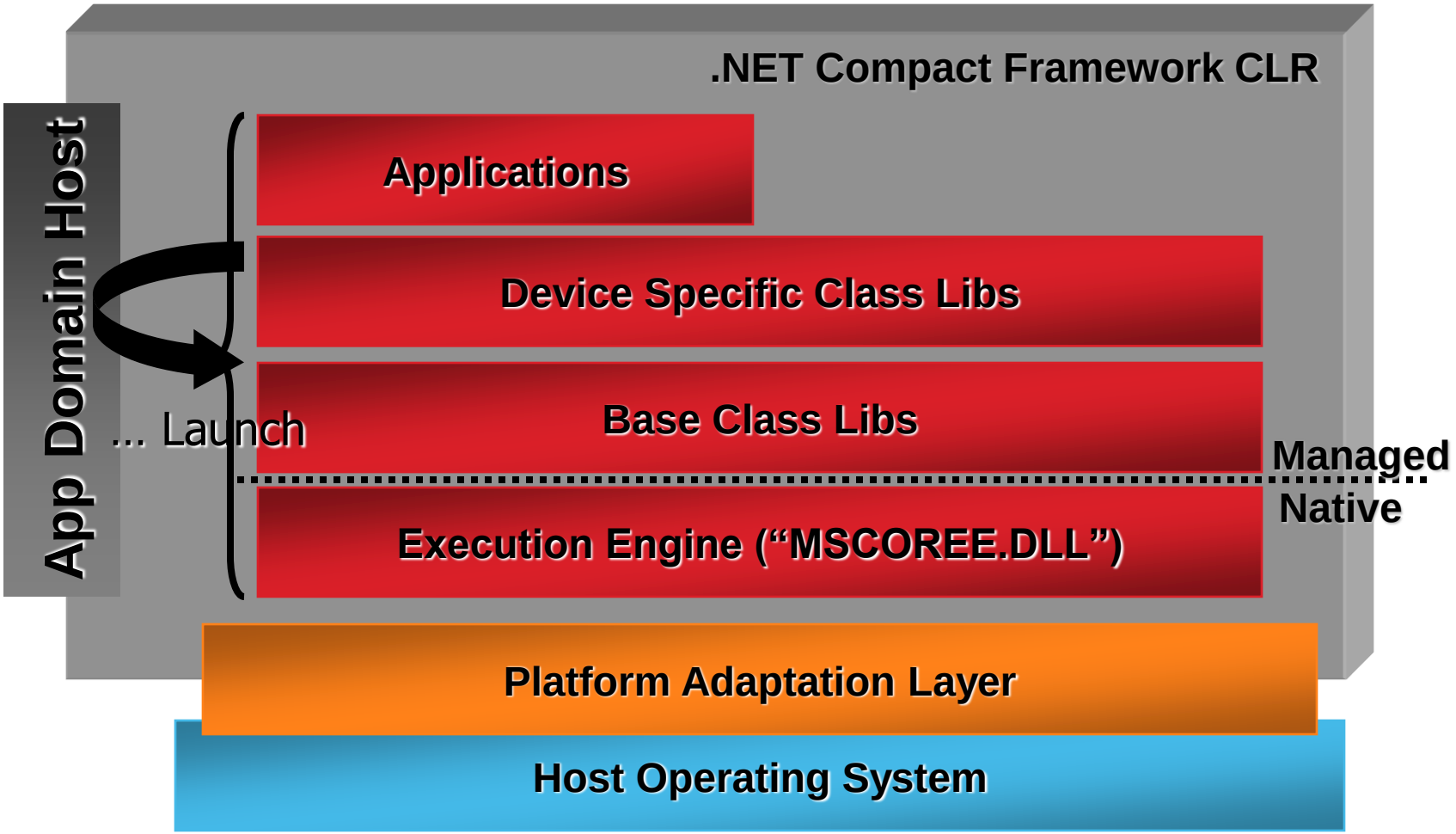
The Framework – “Optimized”

- 20mb → 1.5mb
- Same languages, same code, same MSIL
- Multiple target CPUs / Mobile device

.NET Compact Framework



.NET CF Architecture



Platform Adaptation Layer

- Base Services
  - Threads, sync, timers, memory, math
- Storage
  - Open, close, read/write, directory
  - Direct addressing mode
- Networking
  - Sockets
  - Connection Control
- GUI
  - Framebuffer, char and pointer I/O, Fonts

Execution Engine

- Basic services for managed execution
  - Loader
    - Meta-data engine/cache
    - Representation of class hierarchy/layout
    - Reflection
  - JIT-Compiler/Verifier
  - Execution Infrastructure
    - Exceptions, Native Code InterOp, Security
  - Garbage Collector
  - Debugging Support
  - “Native” implementation of some managed APIs (class libraries)

Class Libs

- Base Types
  - Type conversion, display formatting
  - String manipulation
  - Array.Sort
- Threading & Sync (System.Threading)
- Storage (System.IO)
- Resources (System.Resources)
- Collections (System.Collections)
- Reflection (System.Reflection)
- XML
  - DOM and Reader/Writer
- Networking, Forms, Data Access

Developing in a Compact World

- VS.Net 2003/2005 installation option
- Only C#, VB.Net
- True on-device debugging
  - If you can get it connected…
- Emulator
- Deployment

Developing in a Compact World

VS.NET Integration

- Templates for devices in New Project dialog
  - Template sets device and project type
- Template types
  - Pocket PC Application
  - Pocket PC Class Library
  - Pocket PC Control Library
  - Windows CE .NET Application
  - Mobile Phone Application
- Default set of references that are appropriate for your platform

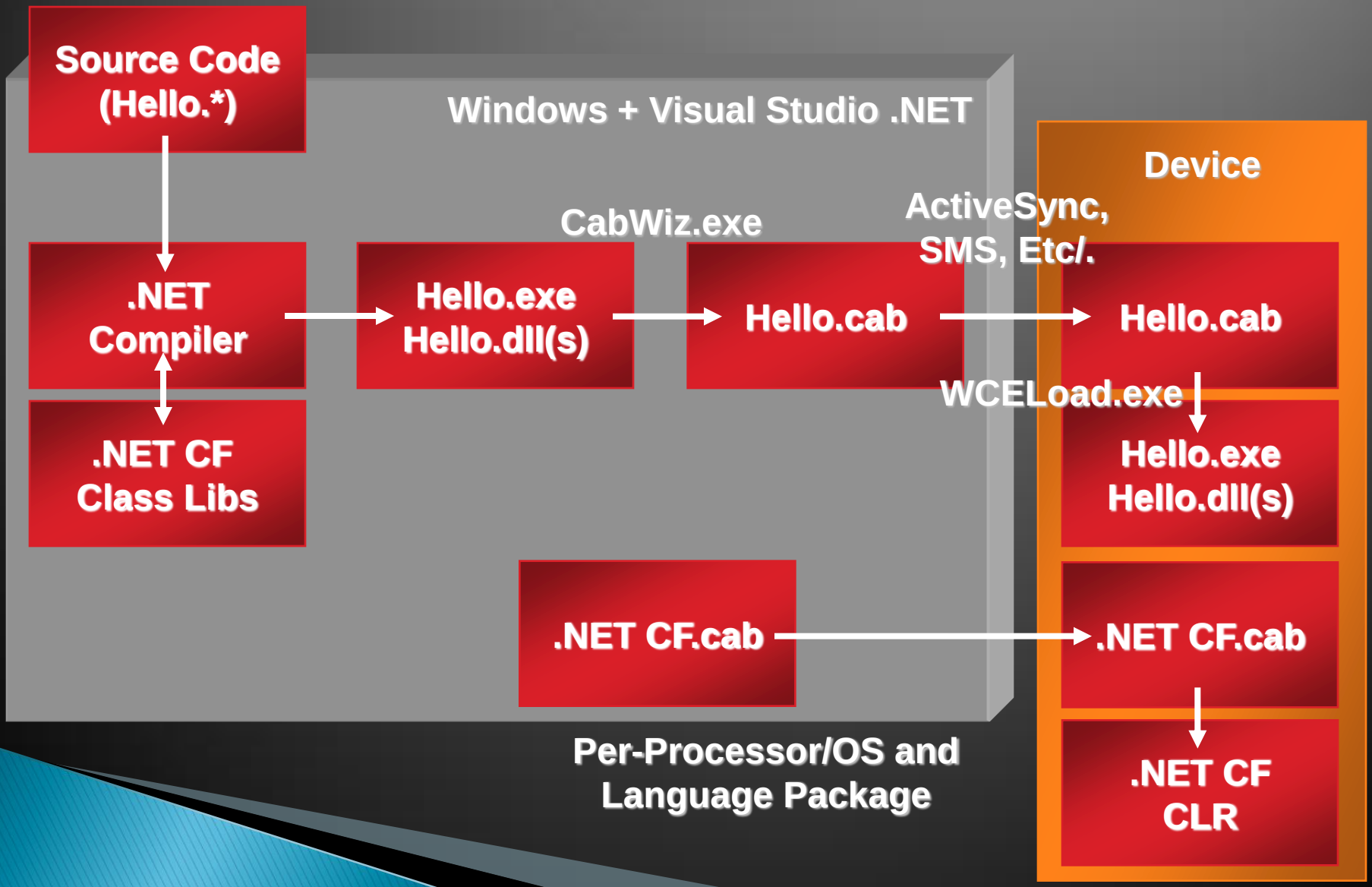
Develop Symbian in VS 2005

- You can get it! You can download **AppForge** plugin!

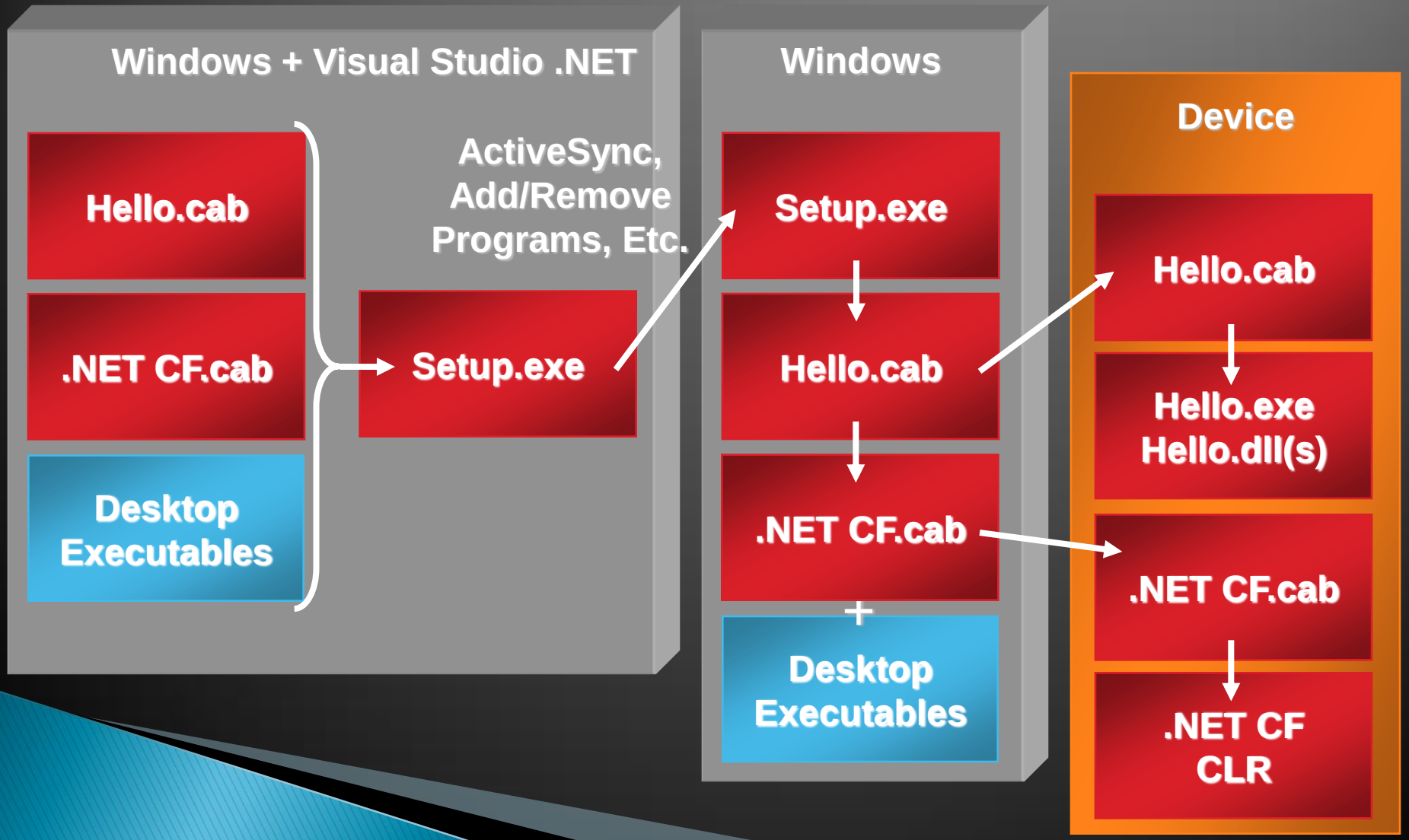
Developing in a Compact World
Deployment

- Same user experience as desktop
- Compiles application for device
- Output Window used for deployment messages
- Visual Studio deploys the framework to device if needed

Packaging and Deployment



More Deployment Options



Working with data: SQL Server CE

- Limited subset of SQL Server functionality
- Good for:
  - Persistent storage locally
  - Persistent storage for occasionally-connected applications and large sets of data
  - Merge Replication
- Currently, SQL Server CE requires an additional installation

Working with data: SQLite

- SQLite adalah database bukan client-server, dia bersifat stand-alone
- Hanya terdiri dari 1 file
  - Berekstensi: .db3
- Perlu download file DLL tambahan agar bisa koneksi:
  - System.Data.SQLite
- Secure, bisa menggunakan bahasa SQL
- Bersifat lokal

Working with data: XML

- Good for:
  - Persistent storage of smaller sets of data
    - Local storage
    - Occasionally-connected computing
  - Not as secure as SQL Server CE

How Compact ?

	File Size			Classes			Methods		
	NETCF	*Desktop*	*%*	*NETCF*	*Desktop*	*%*	*NETCF*	*Desktop*	*%*
“MSCorEE”	**400K***	**2.2 M**	**18%**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
MSCorLib	**200K**	**2M**	**10%**	**364**	**1286**	**28%**	**3989**	**13817**	**29%**
System	**100K**	**1.2M**	**8%**	**140**	**765**	**18%**	**1090**	**6953**	**16%**
System.Drawing	**20K**	**458K**	**5%**	**41**	**254**	**16%**	**385**	**3509**	**11%**
System.Web.Services	**67K**	**503K**	**13%**	**54**	**274**	**20%**	**302**	**2083**	**14%**
System.Windows.Forms	**56+55K**	**2M**	**5%**	**43**	**823**	**5%**	**393**	**11337**	**3%**
System.XML	**138K**	**1.2M**	**12%**	**100**	**724**	**14%**	**927**	**7227**	**13%**

*** .NETCF file size of MSCorEE is for Win32/x86 version**

Framework Size

- Framework size (RAM or ROM)
  - ~1.5 MB
- Running RAM needs
  - 1 MB+ (depends on app)
- Typical application sizes
  - 5 – 100 KB
  - Apps often smaller due to use of platform features in the framework