

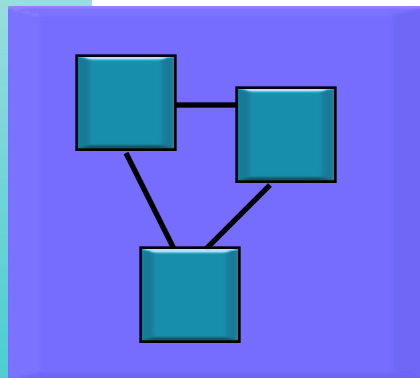
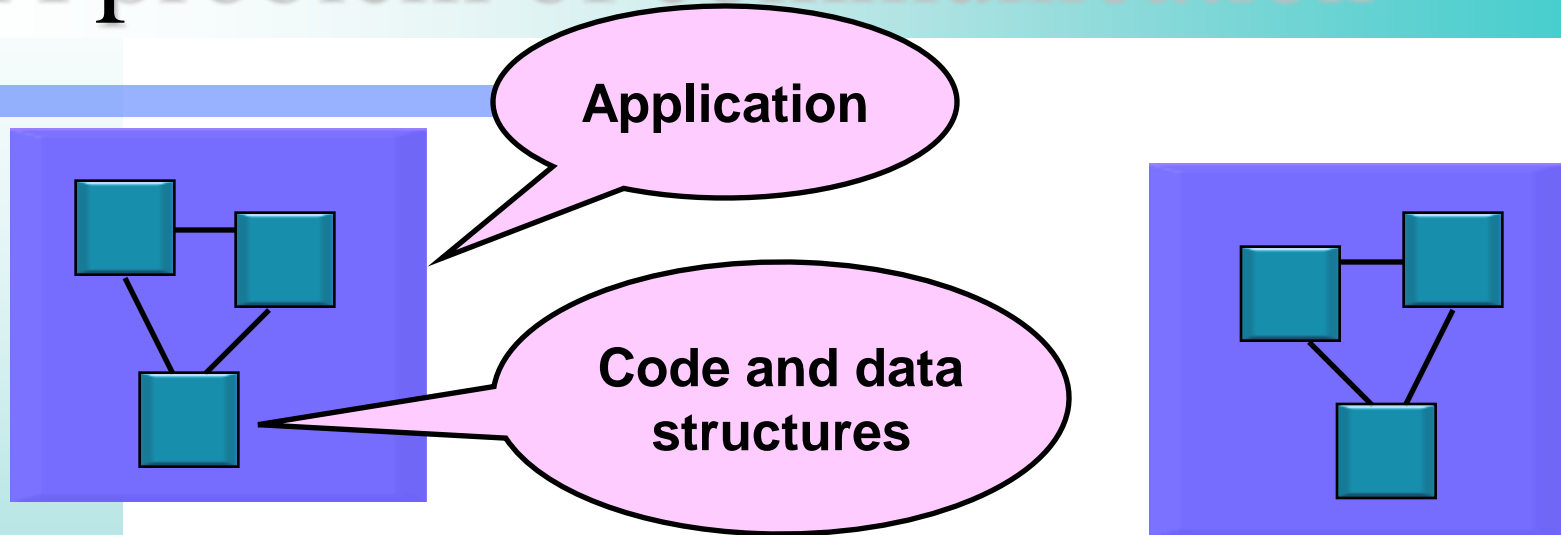


Università di Pisa

# .Net Overview

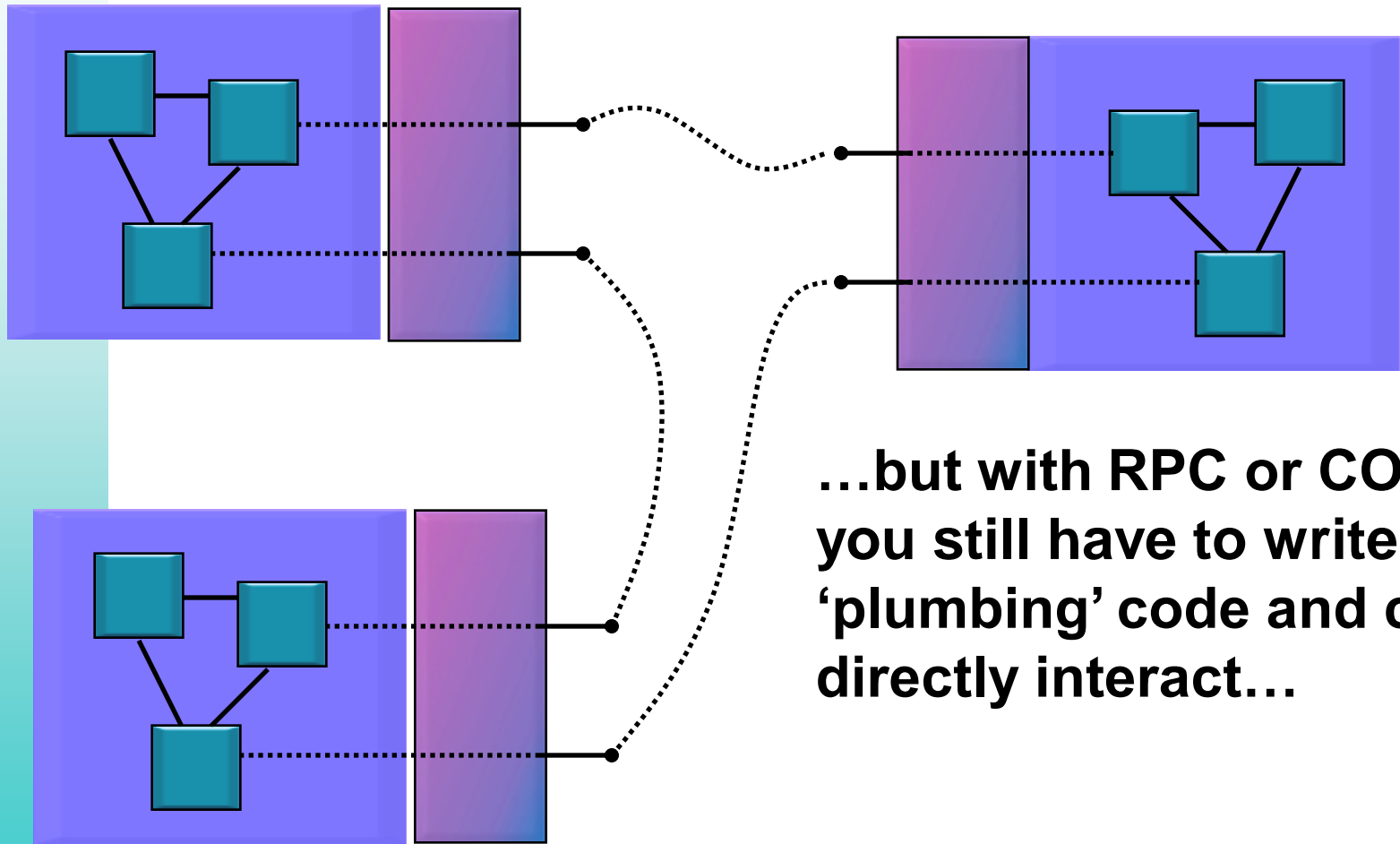
Giuseppe Attardi  
Università di Pisa

# A problem of communication



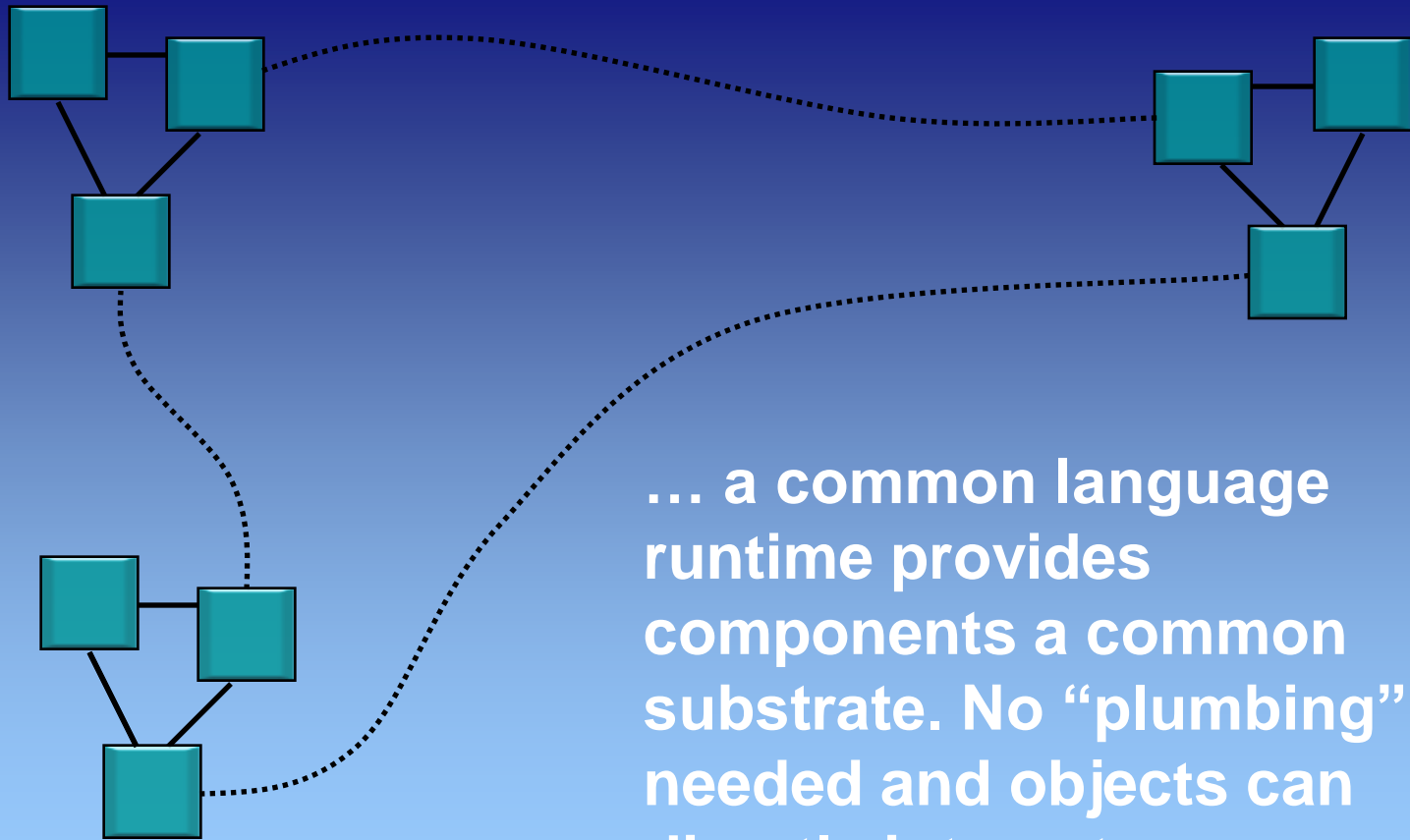
**Before RPC-style models, applications were completely separate entities with little or no integration...**

# A problem of communication



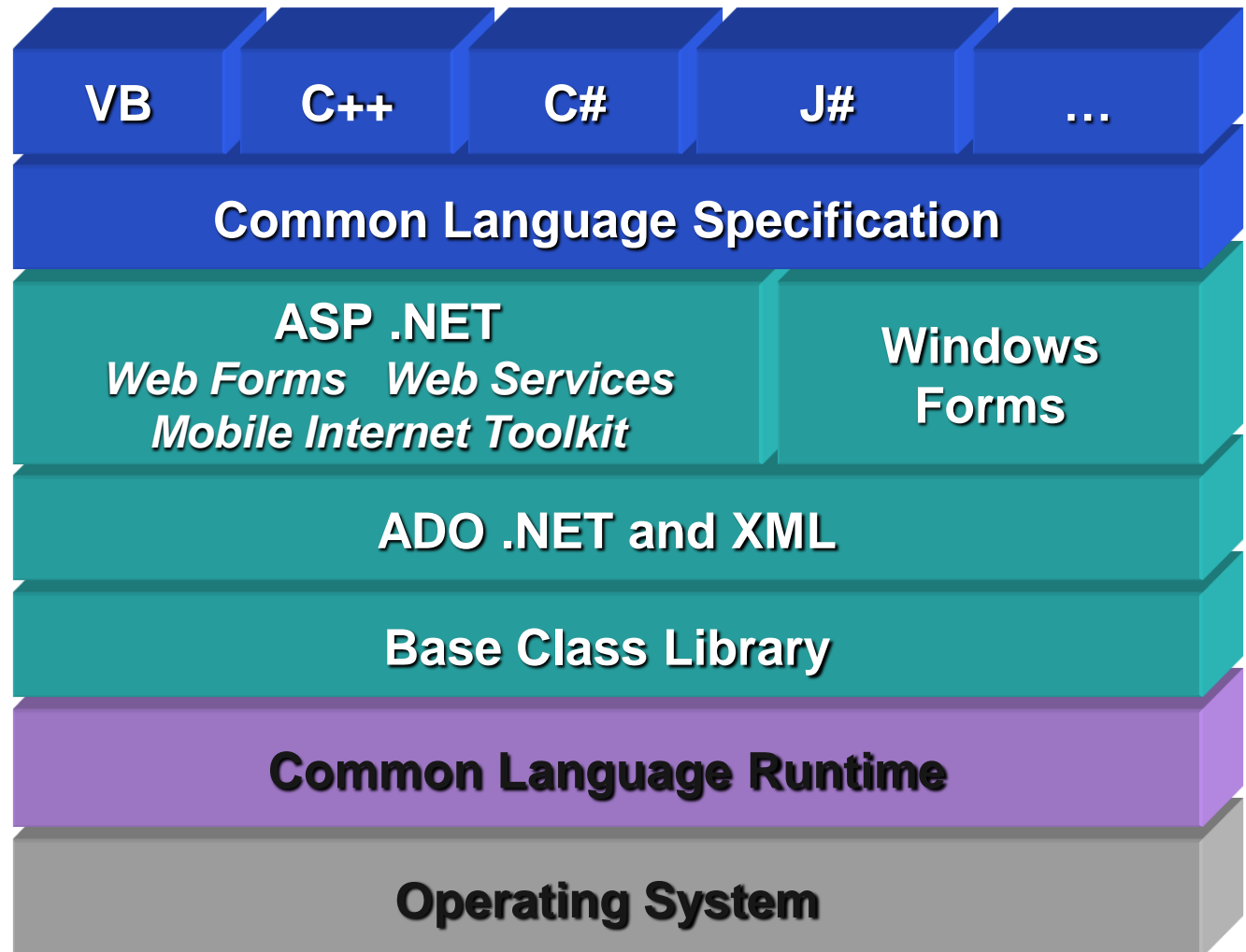
**...but with RPC or COM,  
you still have to write  
'plumbing' code and can't  
directly interact...**

# The .NET Approach



... a common language runtime provides components a common substrate. No “plumbing” is needed and objects can directly interact.

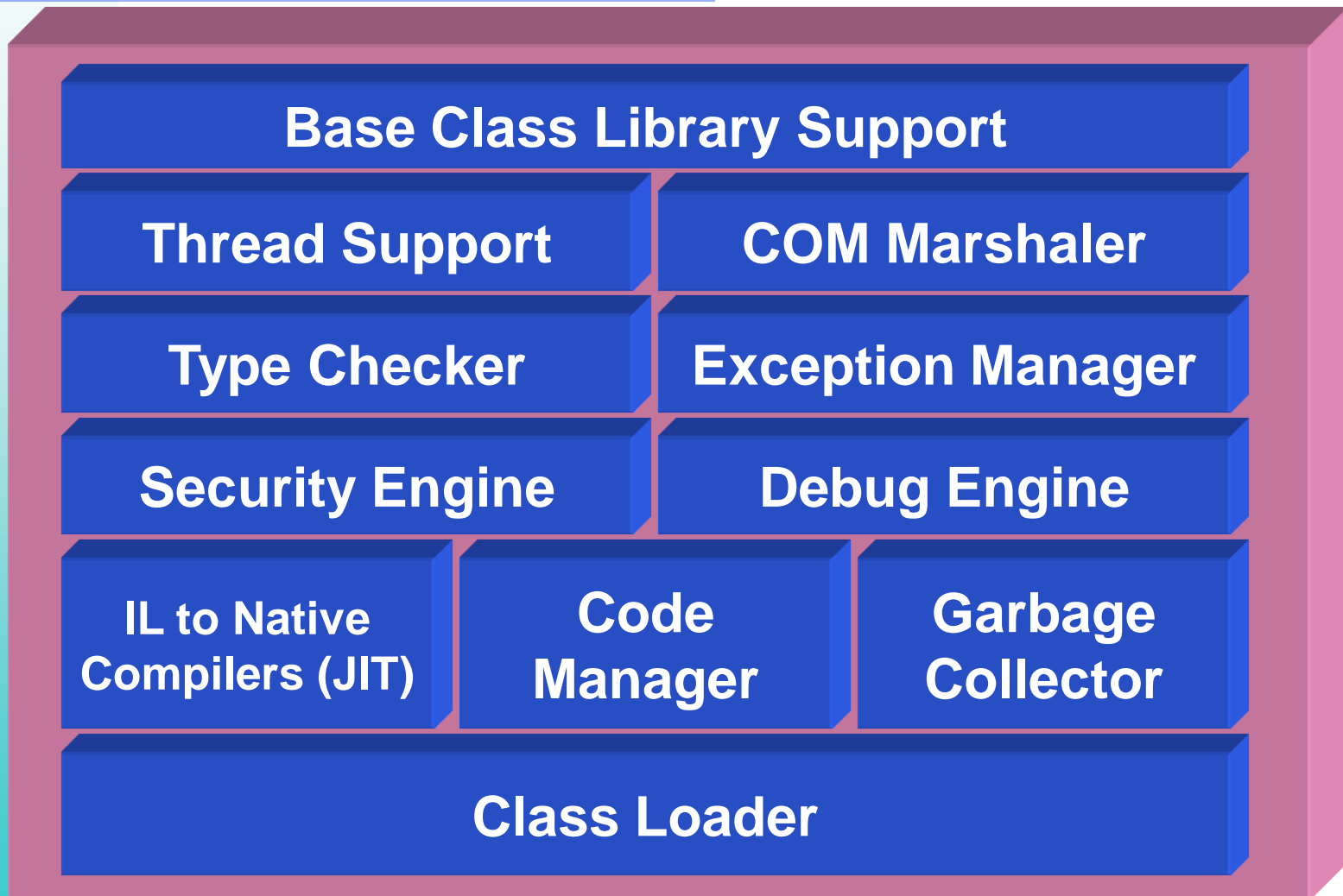
# .NET Framework and Tools



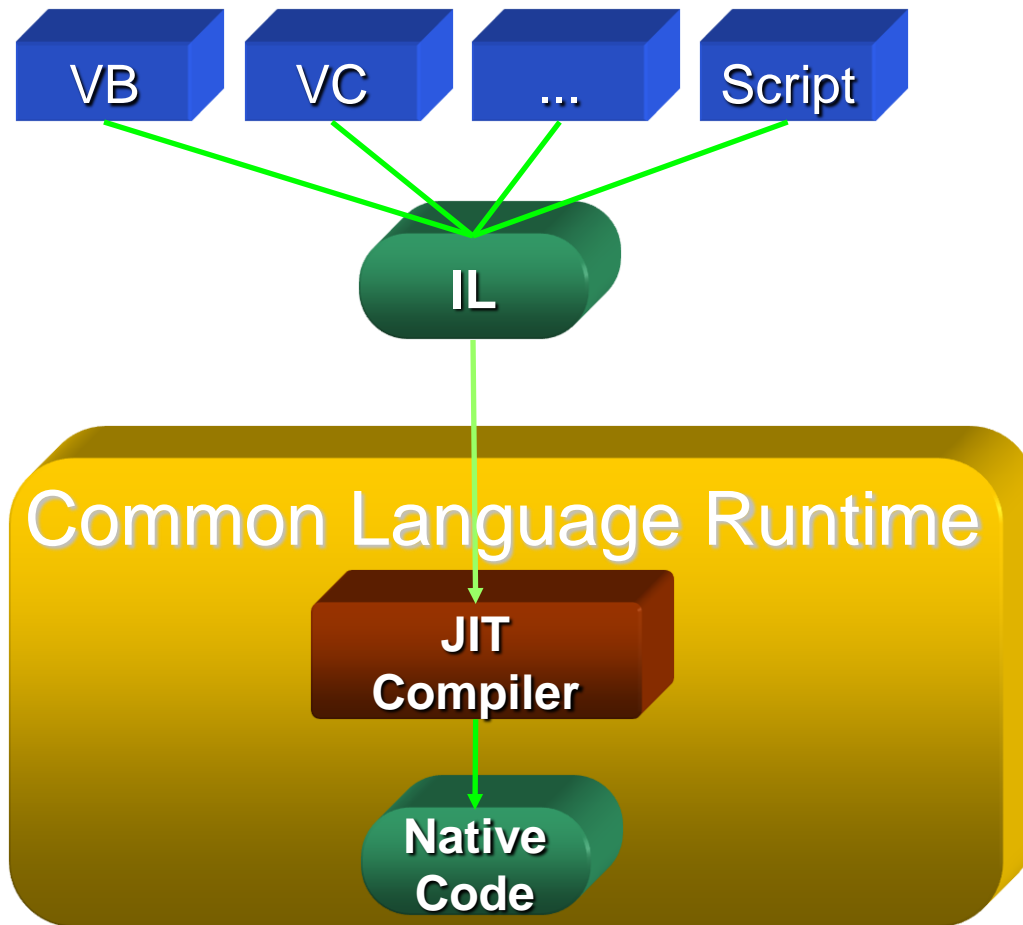
# Common Language Runtime

- **Common Type System**
- **Metadata**
- **Execution Engine**

# Common Language Runtime



# Intermediate Language (IL)

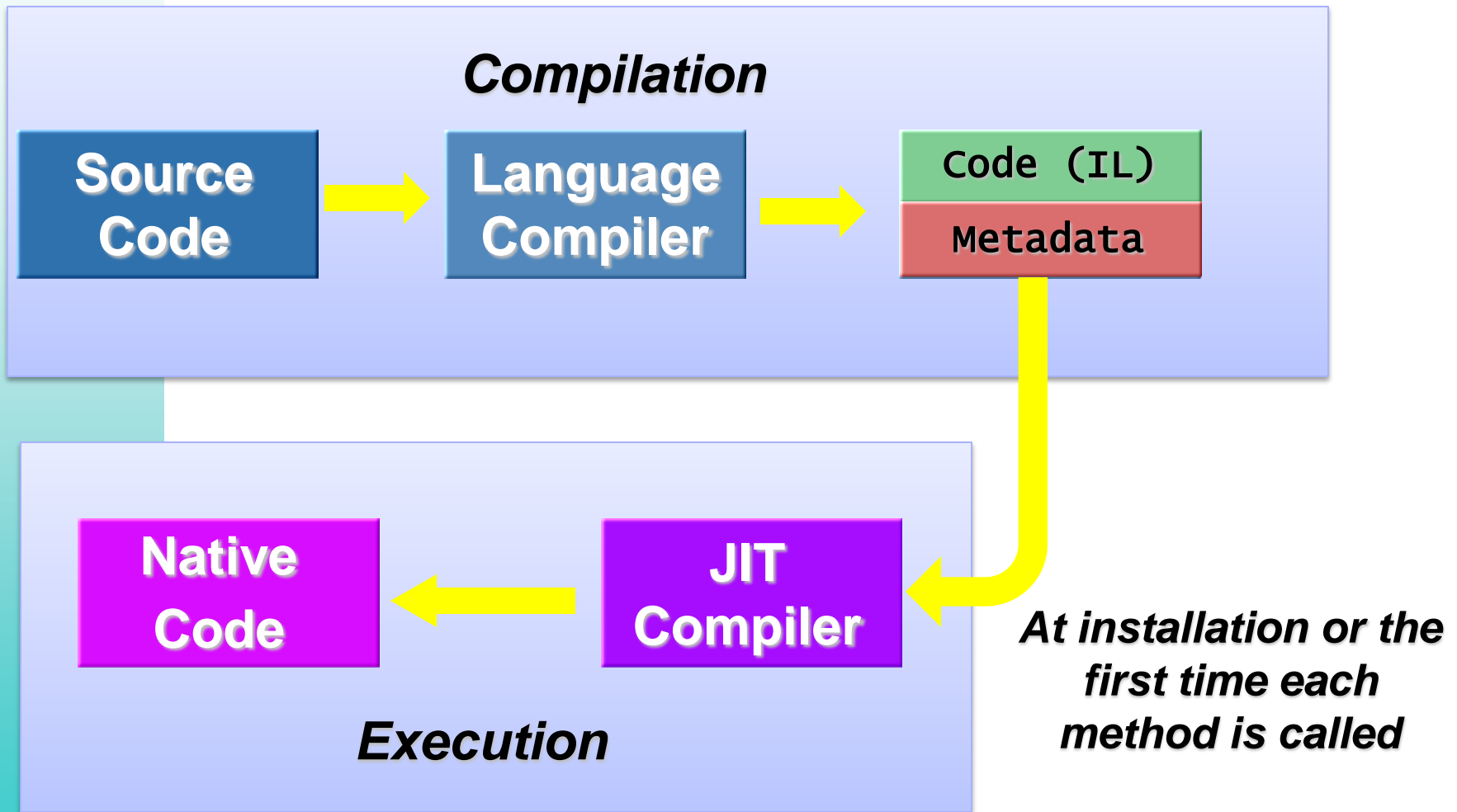


**Assembly  
Language  
of CLR**

**Code is  
never  
interpreted**



# Compilation and Execution



# .NET Languages

- **C#**
- **C++**
- **Visual Basic**
- **APL**
- **COBOL**
- **Eiffel**
- **Forth**
- **FORTRAN 95**
- **F#**
- **Haskell**
- **Mercury**
- **Mondrian**
- **Oberon**
- **Pascal**
- **Perl**
- **Python**
- **RPG**
- **S#**
- **Scheme**
- **SML**

# .NET Framework Class Library

## System.Web

Services

Description

Discovery

Protocols

Caching

Configuration

UI

HtmlControls

WebControls

Security

SessionState

## System.Windows.Forms

Design

ComponentModel

## System.Drawing

Drawing2D

Imaging

Printingy

Text

## System.Data

OleDb

Common

SqlClient

SQLTypes

## System.Xml

XSLT

XPath

Serialization

## System

Collections

Configuration

Diagnostics

Globalization

IO

Net

Reflection

Resources

Security

ServiceProcess

Text

Threading

Runtime

InteropServices

Remoting

Serialization

# Simpler Development

- **Completely eliminates plumbing**
  - No registration, GUIDs, .IDL files, HRESULTs, IUnknown, AddRef/Release, CoCreateInstance, etc.
- **Object Oriented to the core**
  - Classes and inheritance fully supported
  - Even across languages!
- **Seamless integration**
  - Any .NET class can be used as a COM class with zero extra work
  - COM classes can be imported as .NET classes

# Robust And Secure

- **Automatic lifetime management**
  - All .NET objects are garbage collected
  - No stray pointers, memory leaks
  - Multi-generational mark-and-compact GC
  - Self-configuring, dynamically tuning
- **Exception handling**

# Robust And Secure

- **Several compilation models**
  - Native (e.g. Managed C++)
  - CIL (e.g. VB and C#)
  - No interpreter: install-time or run-time IL to native compilation
- **Code correctness and type-safety**
  - CIL can be verified to guarantee type-safety
  - No unsafe casts, no uninitialized variables, no out-of-bounds array indexing
- **Evidence-based security**
  - Based on origin of code as well as user
  - Extensible permissions

# Multi-Language Platform

- **The freedom to choose language**
  - All features of .NET platform available to any .NET programming language
  - Application components can be written in multiple languages
- **Highly leveraged tools**
  - Debuggers, profilers, code coverage analyzers, etc. work for all languages

# Simpler Deployment And Management

- **Assemblies**
  - The unit of deployment, versioning, and security
  - Like DLLs, but self-describing through manifest
- **Zero-impact install**
- **Side-by-side execution**
  - Multiple versions of the same component can co-exist



# .NET Classes

- **Namespaces and Classes**
  - Hierarchical, unified, extensible class libraries
  - Provide “system” and base functionality and services
  - Everything is an object!
- **Interfaces**
  - The .NET (Service) contracts
- **Types**
  - Byte, Sbyte, Single, Double, String, Int16, Int32, Int64, ...
  - Common Type System

# Shared Source CLI (Rotor)

- **Non-commercial implementation**
- **Available for research, academic and other non-profit use**
- **Written in C#, on top of PAL**
- **Available for FreeBSD, Linux and WinXP**
- **<http://dotnet.di.unipi.it>**

# Comparison

- **Java**

- One language
- Multiple platforms

- **.NET**

- Multiple languages
- A few platforms
  - Windows
  - FreeBSD (Rotor)
  - Linux, GNU (DotGNU)
  - Mono Project (Novell)