



## Lecture # 2

# Introduction to .NET Framework and C#

**Engr. Fiaz Khan**



# Today's Agenda

**01** What is .NET

**02** Objective

**03** The .NET Framework

**04** Common Language Runtime (CLR)

**05** Intermediate Language (IL)

**06** Compilation in .NET

اَلْحَمْدُ لِلّٰهِ رَبِّ الْعٰلَمِيْنَ وَالصَّلٰوةُ وَالسَّلَامُ عَلٰى سَيِّدِ الْمُرْسَلِيْنَ  
اَمَّا بَعْدُ فَاَعُوْذُ بِاللّٰهِ مِنَ الشَّيْطٰنِ الرَّجِيْمِ بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِيْمِ



اَللّٰهُمَّ افْتَحْ عَلَيْنَا حِكْمَتَكَ وَاَنْشُرْ  
عَلَيْنَا رَحْمَتَكَ يَا ذَا الْجَلَالِ وَالْاِكْرَامِ

### Translation

O Allah عَزَّوَجَلَّ! Open the door of knowledge and wisdom for us,  
and have mercy on us! O the One Who is the Most Honourable  
and Glorious! (*Al-Mustatraf*, vol. 1, pp. 40)

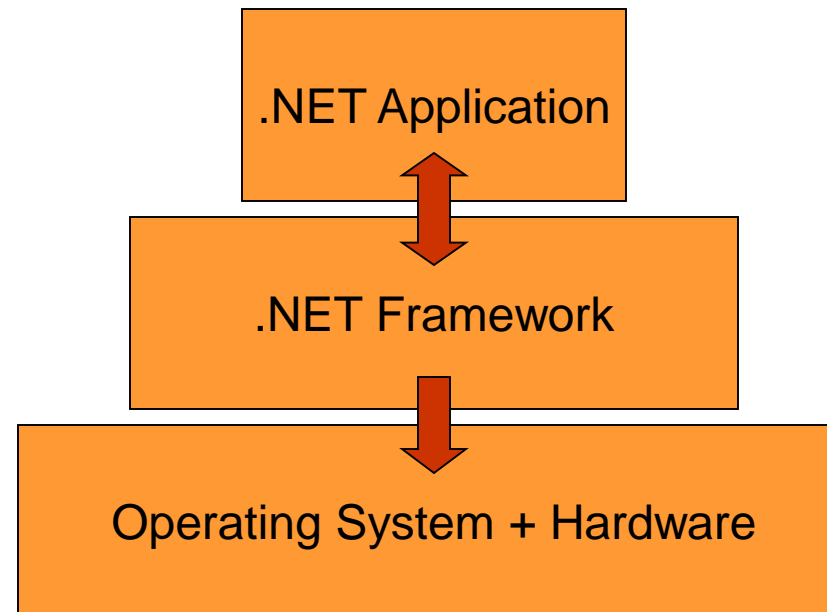
# Lets Start Learning

Whoever recites Salat upon me one time, Allah عَزَّوَجَلَّ sends ten blessings upon him. (*Sahih Muslim, pp. 216, Hadees 408*)

جس نے مجھ پر ایک بار دُرودِ پاک پڑھا اللہ عَزَّوَجَلَّ اُس پر دس رحمتیں بھیجتا ہے۔

(مُسْلِم ص ۲۱۶ حدیث ۴۰۸)

# .NET – What is it?





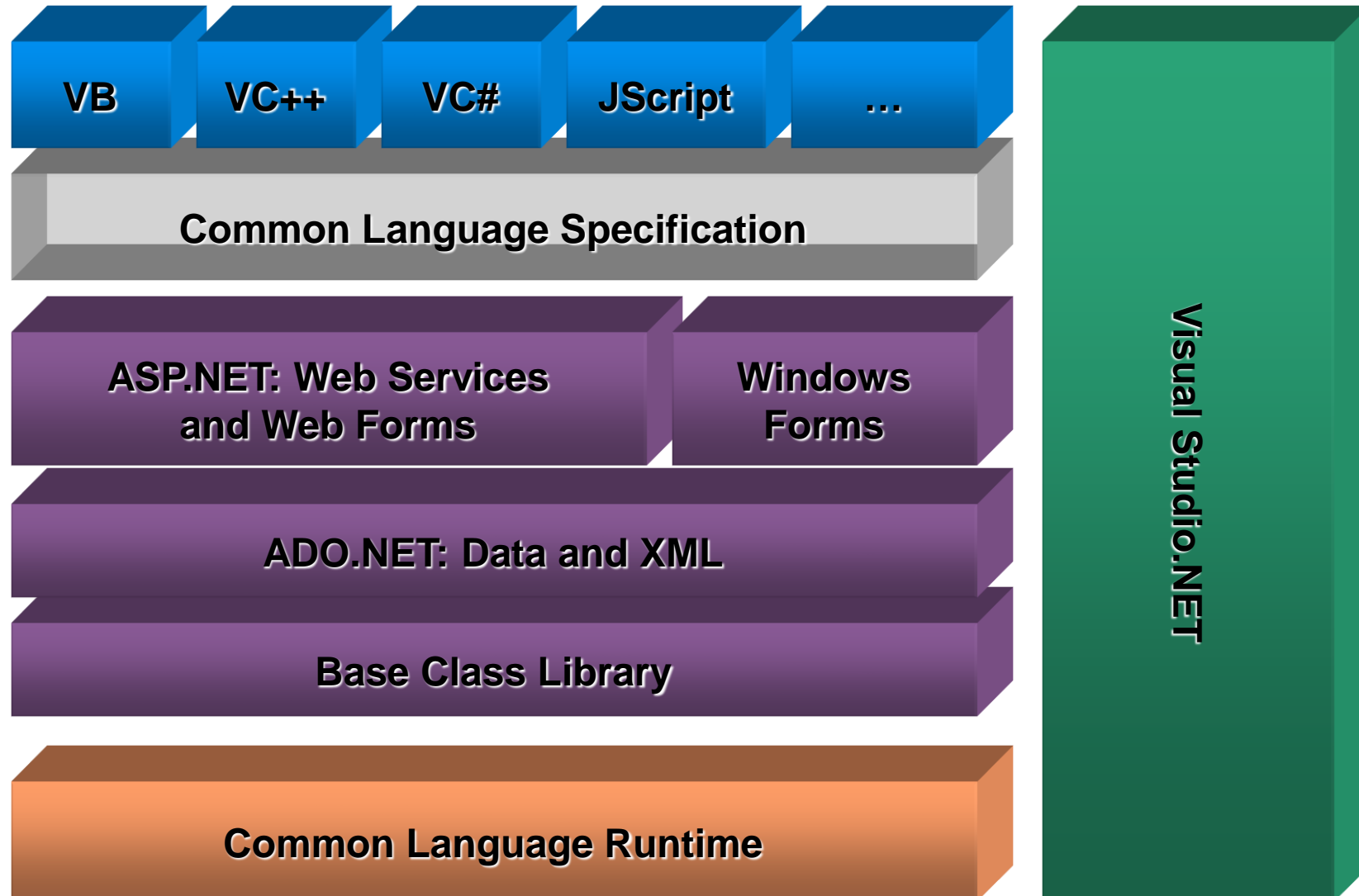
# Objectives

*“Microsoft .NET is based on the .NET Framework, which consists of two major components: the Common Language Runtime (CLR) and an extensive set of Framework Class Libraries (FCL). The CLR defines a common programming model and a standard type system for cross-platform, multi-language development.”*

- CLR-based execution
- Application designs



# Framework, Languages, And Tools





# The .NET Framework

## .NET Framework Services

- Common Language Runtime
- Windows<sup>®</sup> Forms
- ASP.NET
  - Web Forms
  - Web Services
- ADO.NET, evolution of ADO
- Visual Studio.NET





# 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
  - Interactive Development Environment (IDE)



# Common Language Runtime

- Development
  - Mixed language applications
    - Common Language Specification (CLS)
    - Common Type System (CTS)
    - Standard class framework
    - Automatic memory management
  - Consistent error handling and safer execution
  - Potentially multi-platform
- Deployment
  - Removal of registration dependency
  - Safety – fewer versioning problems



# Common Language Runtime

## Multiple Language Support

- CTS is a rich type system built into the CLR
  - Implements various types (int, double, etc)
  - And operations on those types
- CLS is a set of specifications that language and library designers need to follow
  - This will ensure interoperability between languages

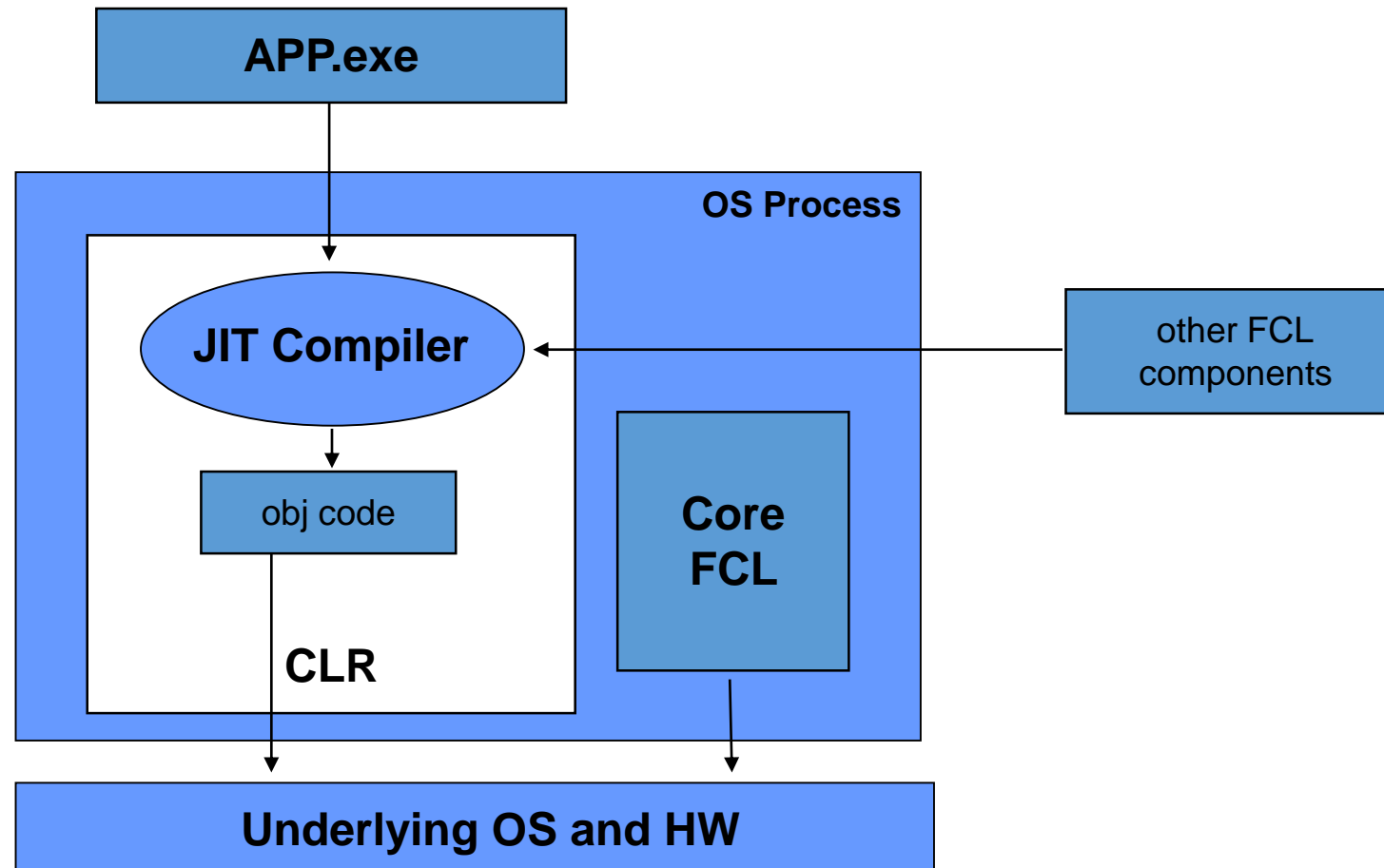


# Intermediate Language (IL)

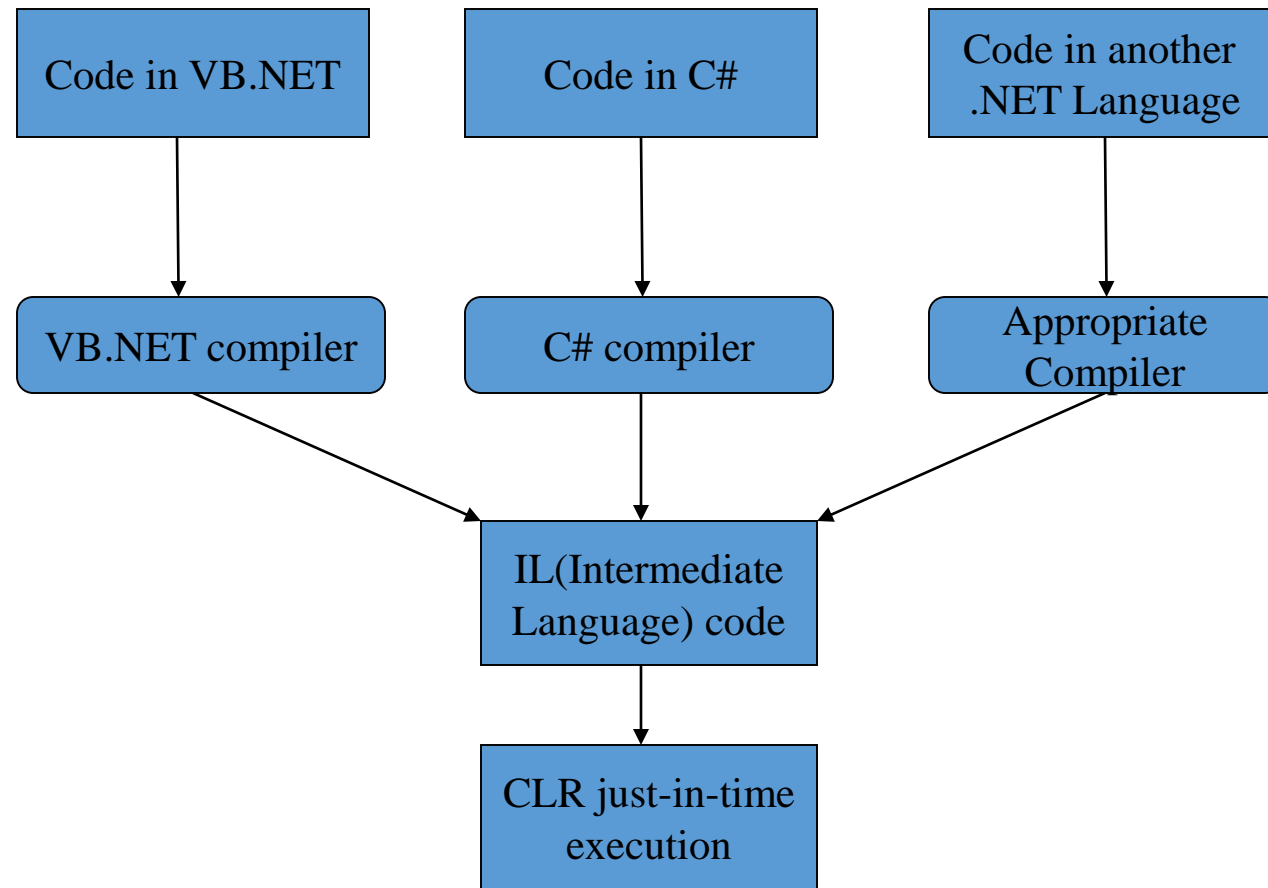
- .NET languages are not compiled to machine code. They are compiled to an Intermediate Language (IL).
- CLR accepts the IL code and recompiles it to machine code. The recompilation is just-in-time (JIT) meaning it is done as soon as a function or subroutine is called.
- The JIT code stays in memory for subsequent calls. In cases where there is not enough memory it is discarded thus making JIT process interpretive.

# CLR-based execution

- Common Language Runtime must be present to execute code:



# Compilation in .NET





# Languages

- Languages provided by MS
  - VB, C++, C#, J#, JScript
- Third-parties are building
  - APL, COBOL, Pascal, Eiffel, Haskell, ML, Oberon, Perl, Python, Scheme, Smalltalk...



# ASP.NET

- Logical Evolution of ASP
  - Supports multiple languages
  - Improved performance
  - Control-based, event-driven execution model
  - More productive
  - Cleanly encapsulated functionality





# Visual Studio.NET

- Development tool that contains a rich set of productivity and debugging features



# Summary

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



ENGR. FIAZ KHAN



LECTURER COMPUTER SCIENCE

TELF/EF SET / ACEPT CERTIFIED

MICROSOFT ACADEMY TRAINER

ORACLE CERTIFIED PROFESSIONAL

GOOGLE CERTIFIED PROFESSIONAL

Lahore, Pakistan



+92-336-678-2755

[muhammad.fiaz@pucit.edu.pk](mailto:muhammad.fiaz@pucit.edu.pk)



<https://www.linkedin/in/fiazofficials>



# THANK YOU!

Do you have any questions?