MS .NET Introduction

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What is C#?

- Microsoft Programming Languages to work with the .NET Framework, .NET Core, or .NET to develop different kinds of applications such as Web, Console, Windows, Restful Services, etc
- C#.NET is a completely Object-Oriented Programming Language
- NET stands for Network Enabled Technology, dot(.) refer to OO & NET refer to internet i.e. we can implement internet based applications.

C# is a flexible general-purpose language

- Console applications
- Desktop applications (Windows Forms, WPF)
- Windows Services
- Web Services and Web applications (ASP.NET Core, Blazor)
- Native Mobile Applications (.NET MAUI)
- AI Applications (ML.NET)
- Distributed and Cloud Applications (Azure)
- Games (Unity)
- IoT applications
- Reusable libraries

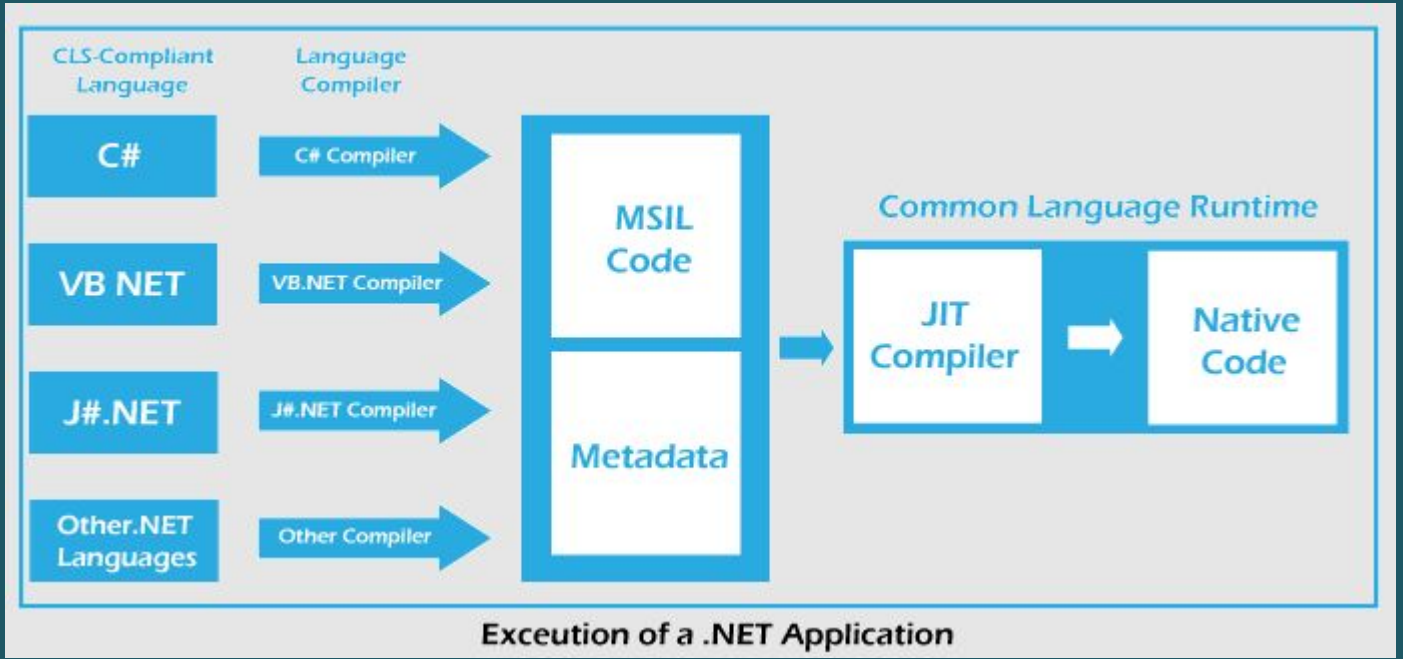
What .NET Framework provides?

1. BCL (Base class libraries) - building block of .net programs, this are installed into machine when we installed .NET framework. It contains predefined classes which are used for application development.

   Location : C:\Windows\assembly

2. CLR (Common Language Runtime) - It is responsible for converting MSIL(Microsoft Intermediate Language) code into native code & then execute it.

How .NET application compiled & run?



Exceution of a .NET Application

JIT (Just-in-Time)

It is component of CLR which is responsible for converting MSIL code into Native code.

Native code directly understandable to OS.

Types of .NET framework:

1. DOTNET: runs on windows OS
2. .NET Mono: Run application on unix, linux, MAC.
3. DOTNET Compact: Run on Mobile Phones

IL (Intermediate language code)

1. It is half compiled/partial compiled CPU independent partially compiled code.

CLR Components:

1. Security Manager
2. JIT Compiler
3. Memory manager
4. Garbage collector
5. Exception Manager
6. Common Language Specification(CLS)
7. Common Type System (CTS)

1. Security Manager:

There are two components to manage security:

1. CAS (Code Access Security)
2. CV (Code verification)

These 2 components checks privileges of current user that user is allowed to access the assembly or not

Also it check what kind if right this code has and whether it is safe to be executed by the OS

Memory Manager & Exception Manager

1. Memory Manager: Allocates necessary memory for variables and objects in application.
2. Exception Manager: This component of CLR in .NET redirect the control to execute the catch and finally blocks whenever exception occurred at run time.

Garbage collection

GC runs continuously as a background thread & at specific time interval, it checks whether there are any unused managed objects & if it finds it simply clean those objects & reclaim the memory.

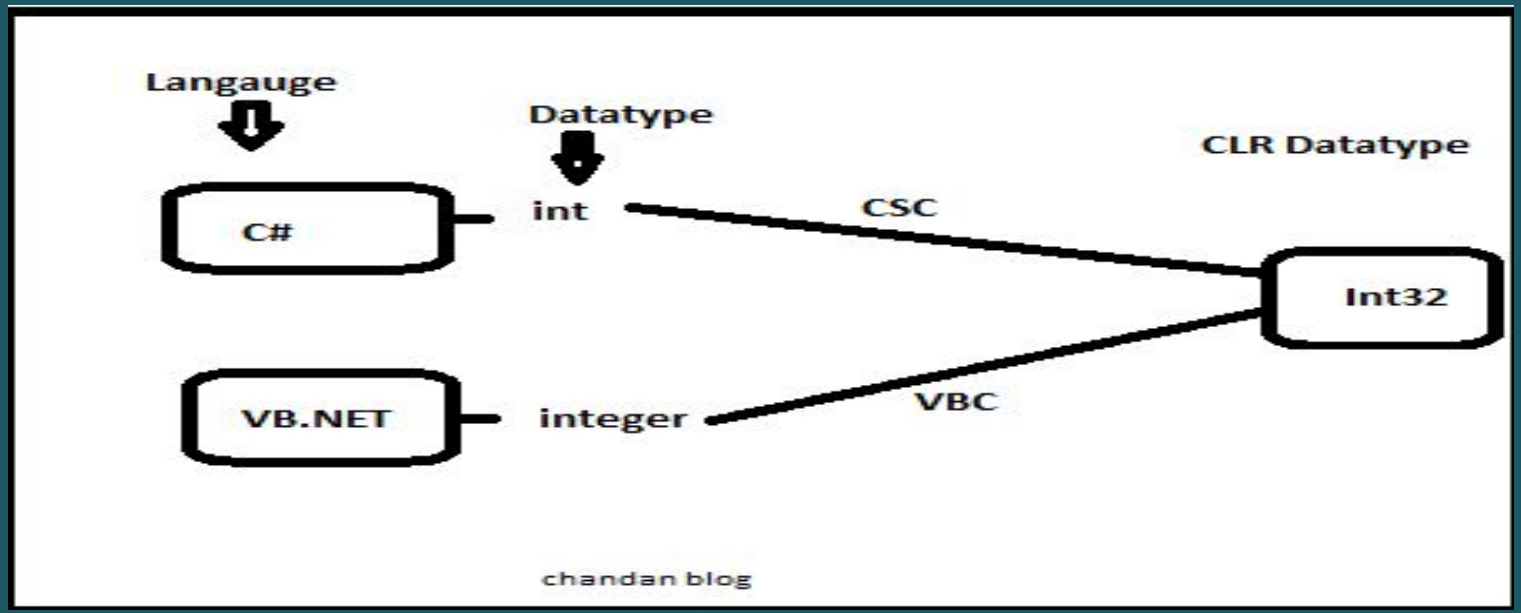
Note: GC will destroy only unused managed objects but not unmanaged objects.

1. Free developer from having to manually release memory.
2. Allocate object on managed heap efficiently.
3. Keeps memory available for future allocation.
4. Provides memory safety by making sure that an object cannot use the content of another object.

Common Type System [CTS]

- .NET framework supports many programming languages like C#, VB.NET, J# etc. Each language has its own data type. And one programming language cannot understand other programming language data types.
- But, there can be situations when you want to code into one language and called in other language.
- CTS which ensure that type defined in two different languages gets compiled to common data type.

Common Type System [CTS]



Common Language Specification [CLS]

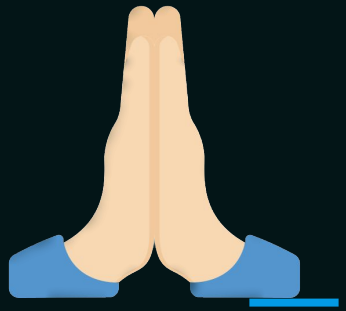
- One programming language cannot understand other programming language syntactical rules.
- CLR cannot understand programming language specification rather CLR has its own language specification for its MSIL. At time of every language compilation each compiler has to follow this specification of CLR and generate the MSIL code.

Managed Code Vs Unmanaged Code

1. Run under complete control of CLR.
2. Run by dotnet runtime environment.If .net framework not install, code Will not run.
3. CLR provide facility like memory Management, garbage collector, Exception manager etc.

1. Not run under control of CLR. it run under their own environment.

Thank You



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