UNIT 1

Constituents/Architecture/Components of .NET Framework

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The .NET Framework is composed of four main components:

1. Common Language Runtime (CLR)
2. Framework Class Library (FCL),
3. Core Languages (WinForms, ASP.NET, and ADO.NET), and
4. Other Modules (WCF, WPF, WF, Card Space, LINQ, Entity Framework, Parallel LINQ, Task Parallel Library, etc.)

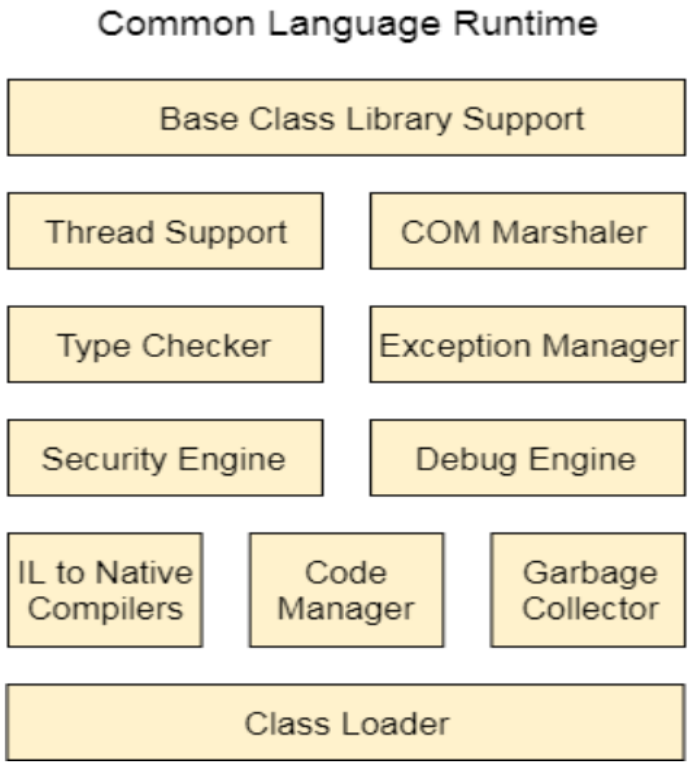
1. Common Language Runtime (CLR)

It is a program execution engine that loads and executes the program. It converts the program into native code. It acts as an interface between the framework and operating system.

CLR Functions :

- It converts the program into native code.
- Handles Exceptions
- Provides type-safety
- Memory management
- Provides security
- Improved performance
- Language independent
- Platform independent
- Garbage collection
- Provides language features such as inheritance, interfaces, and overloading for object-oriented programmings.

A list of CLR components



Base Class Library Support
It is a class library that provides support of classes to the .NET application.

Thread Support
It manages the parallel execution of the multi-threaded application.

COM Marshaler
It provides communication between the COM objects and the application.

Type Checker
It checks types used in the application and verifies that they match to the standards provided by the CLR.

Code Manager
It manages code at execution run-time.

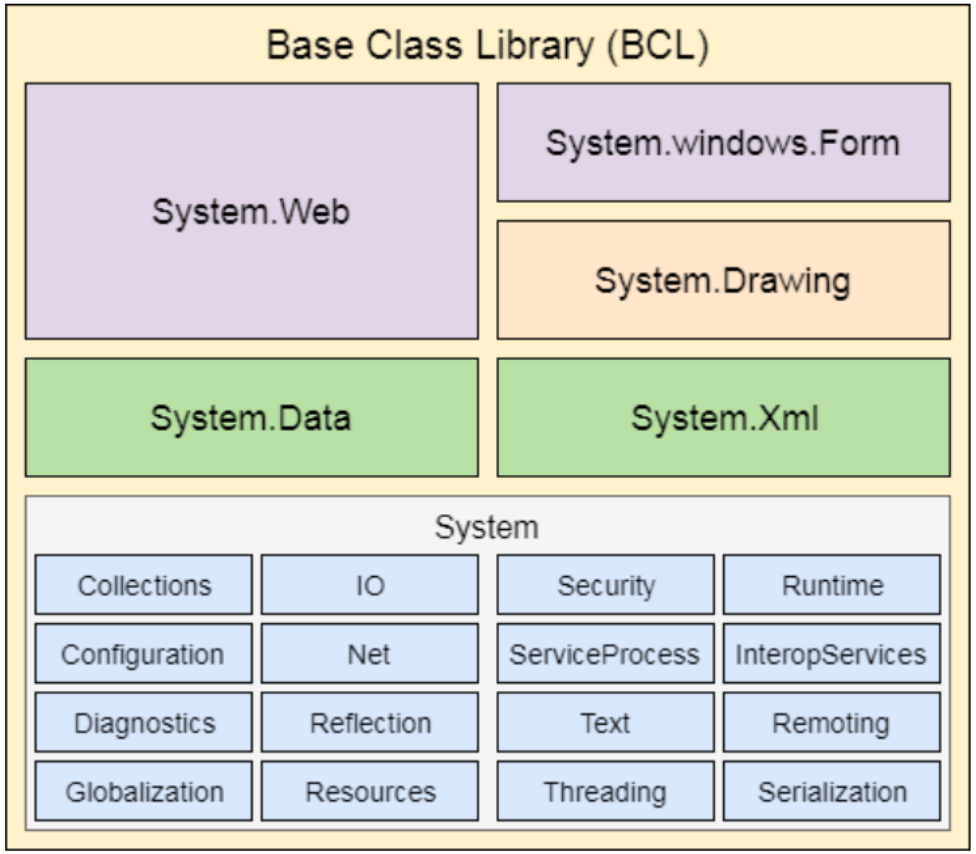
Garbage Collector
It releases the unused memory and allocates it to a new application.

Exception Handler
It handles the exception at runtime to avoid application failure.

ClassLoader
It is used to load all classes at run time.

2. FCL (Framework Class Library)

- It is a standard library that is a collection of thousands of classes, namespaces, interfaces and value types and used to build an application. The BCL (Base Class Library) is the core of the FCL and provides basic functionalities.



3. Core Languages (WinForms, ASP.NET, and ADO.NET)

- **WinForms**

Windows Forms is a smart client technology for the .NET Framework, a set of managed libraries that simplify common application tasks such as reading and writing to the file system.

- **ASP.NET**

ASP.NET is a web framework designed and developed by Microsoft. It is used to develop websites, web applications, and web services. It provides a fantastic integration of HTML, CSS, and JavaScript. It was first released in January 2002.

- **ADO.NET**

ADO.NET is a module of .Net Framework, which is used to establish a connection between application and data sources. Data sources can be such as SQL Server and XML. ADO .NET consists of classes that can be used to connect, retrieve, insert, and delete data.

4. Other Modules (WCF, WPF, WF, Card Space, LINQ, Entity Framework, Parallel LINQ, Task Parallel Library, etc.)

- **WPF (Windows Presentation Foundation)**

Windows Presentation Foundation (WPF) is a graphical subsystem by Microsoft for rendering user interfaces in Windows-based applications. WPF, previously known as "Avalon", was initially released as part of .NET Framework 3.0 in 2006. WPF uses DirectX.

- **WCF (Windows Communication Foundation)**

It is a framework for building service-oriented applications. Using WCF, you can send data as asynchronous messages from one service endpoint to another.

- **WF (Workflow Foundation)**

Windows Workflow Foundation (WF) is a Microsoft technology that provides an API, an in-process workflow engine, and a rehostable designer to implement long-running processes as workflows within .NET applications.

- **LINQ (Language Integrated Query)**

It is a query language, introduced in .NET 3.5 framework. It is used to make the query for data sources with C# or Visual Basics programming languages.

- **Entity Framework**

It is an ORM based open source framework which is used to work with a database using .NET objects. It eliminates a lot of developers effort to handle the database. It is Microsoft's recommended technology to deal with the database.

- **Parallel LINQ**

✓Parallel LINQ or PLINQ is a parallel implementation of LINQ to objects. It combines the simplicity and readability of LINQ and provides the power of parallel programming.

✓It can improve and provide fast speed to execute the LINQ query by using all available computer capabilities.

✓Apart from the above features and libraries, .NET includes other APIs and Model to improve and enhance the .NET framework.

✓In 2015, Task parallel and Task parallel libraries were added. In .NET 4.5, a task-based asynchronous model was added.