✅ 1. What is .NET and .NET Core? (Concept + Evolution)

1.1 What is .NET?

.NET is a **software development platform** created by Microsoft for building applications
→ Web
→ Desktop
→ Mobile
→ Cloud
→ IoT
→ Gaming

It provides:

- **CLR (Common Language Runtime)** → runs .NET applications
- **Base Class Libraries (BCL)** → ready-made functionality
- **Multiple languages** → C#, VB.NET, F#, etc.

Historically .NET had 2 major families:

1. **.NET Framework**
    - Windows-only
    - Used for ASP.NET Web Forms, WPF, WinForms
    - Cannot run on Linux/Mac
    - Last version: **4.8.1**
2. **.NET Core (2016–2020)**
    - Cross-platform (Windows, Linux, macOS)
    - High performance
    - Open-source

In **2020**, Microsoft unified everything into **.NET 5+**.

1.2 What is .NET Core?

.NET Core was a **re-built, modern, cross-platform version** of .NET.
It solved the biggest limitations of .NET Framework.

Key Features

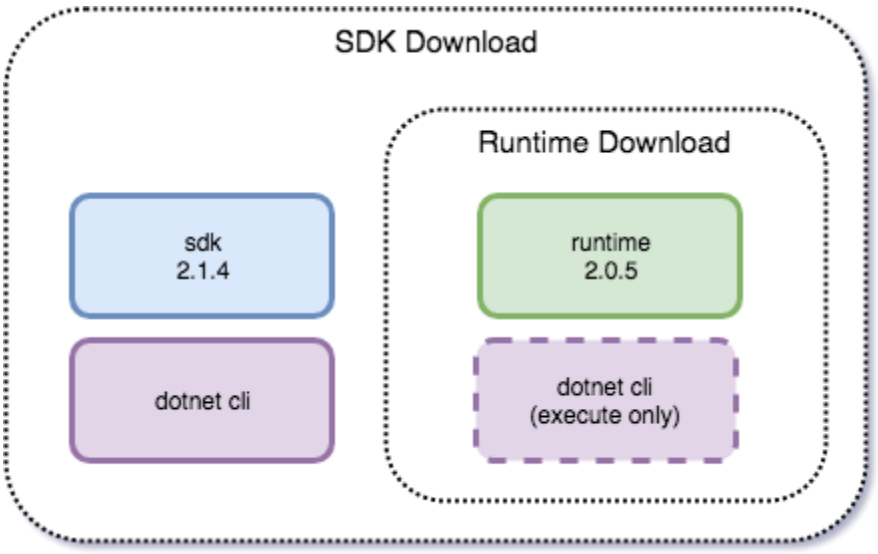
- Cross-platform (Windows/Linux/macOS)
- Open-source (GitHub)
- High-performance Kestrel server
- Modular — lightweight **NuGet-based** architecture

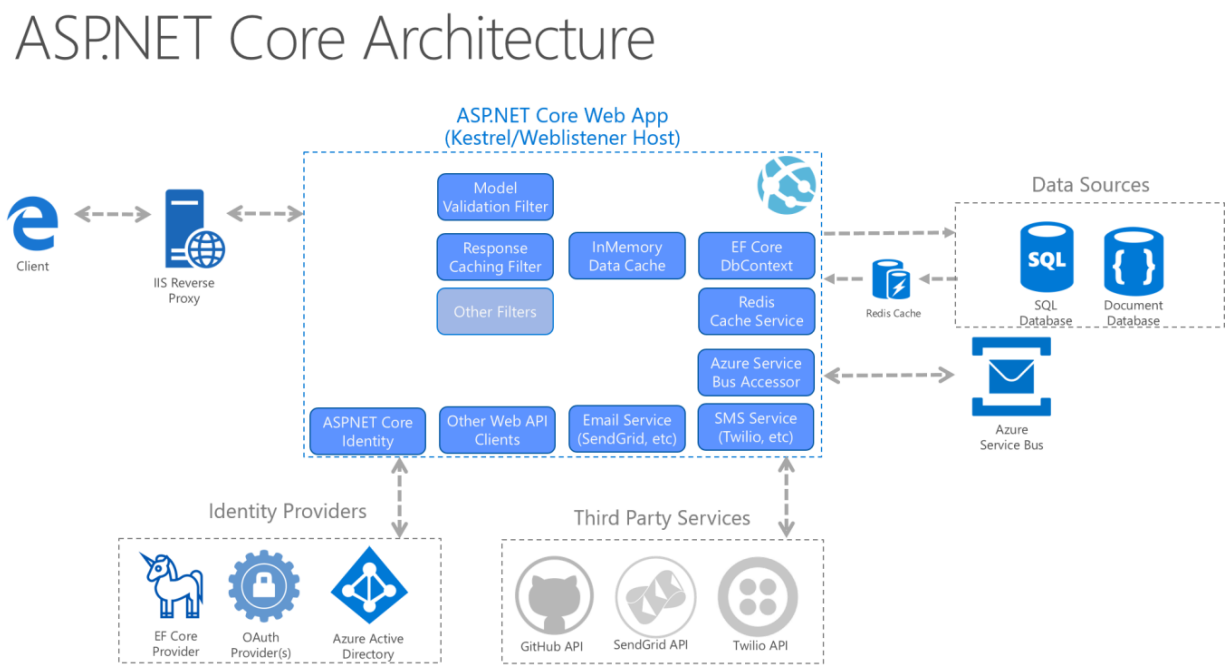
.NET Core Versions

Version	Year	Notes
.NET Core 1.0	2016	First release
.NET Core 2.0	2017	Stable & widely adopted
.NET Core 3.0 / 3.1	2019	Desktop apps support; LTS
.NET 5	2020	Rebranding → unified platform
.NET 6 (LTS)	2021	Most widely used
.NET 7	2022	Performance improvements
.NET 8 (LTS)	2023	Latest LTS
.NET 9	2024	Latest major version
.NET 10	2025	Latest major version

➡️ Today we simply call it **.NET**, but internally it is the continuation of **.NET Core**.

✅ **2. Runtime vs SDK**





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✓ Runtime

The **runtime** is required to *run* .NET applications.

It includes:

- **CLR** (Common Language Runtime)
- JIT compiler
- Base Class Libraries

➡️ If you only want to **run** a .NET app, install **Runtime**.

❗ Runtime **cannot** be used to create or compile projects.

✓ SDK (Software Development Kit)

The SDK is required to **develop** .NET applications.

SDK contains:

- Runtime
- Compilers (Roslyn)
- dotnet CLI
- Project templates
- MSBuild

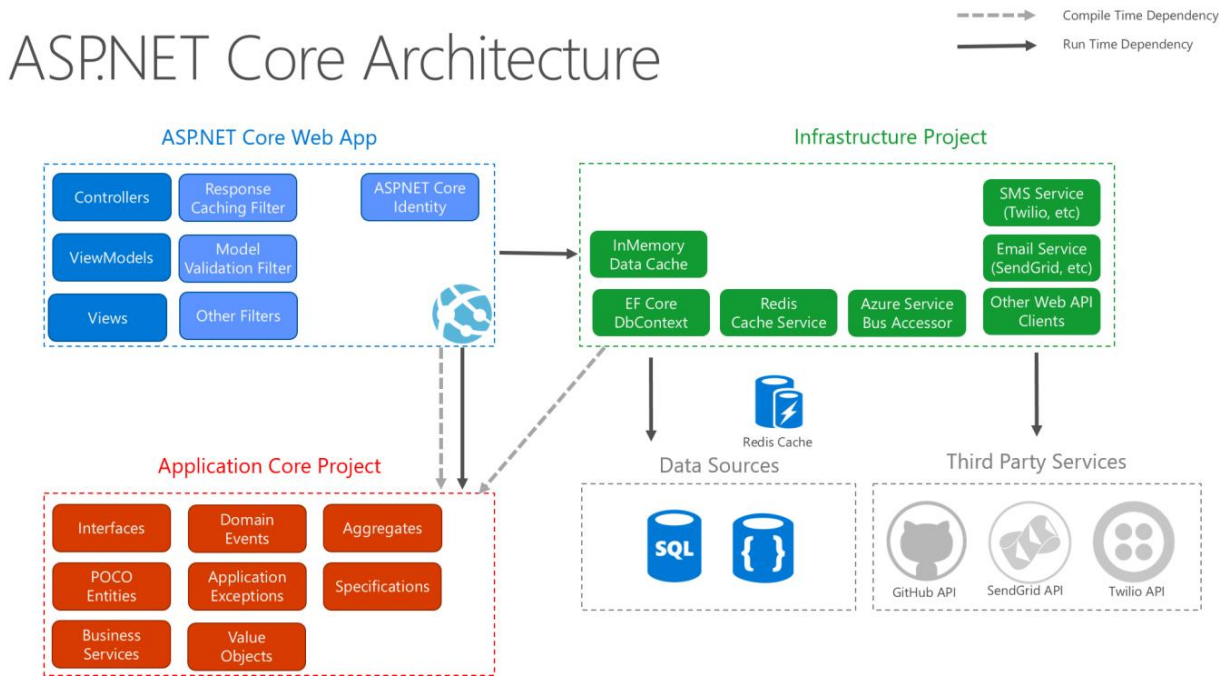
➡️ If you want to **build apps**, install **SDK**.

Simple way to remember:

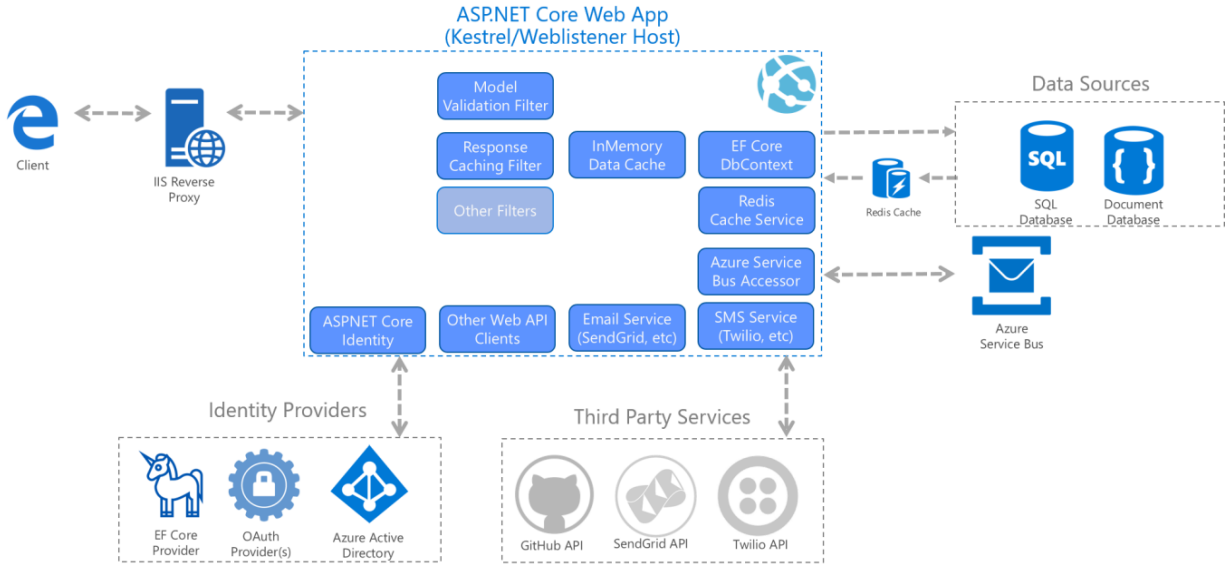
Action	Needs Runtime?	Needs SDK?
Run app	✓	✕
Build/Develop app	✓	✓

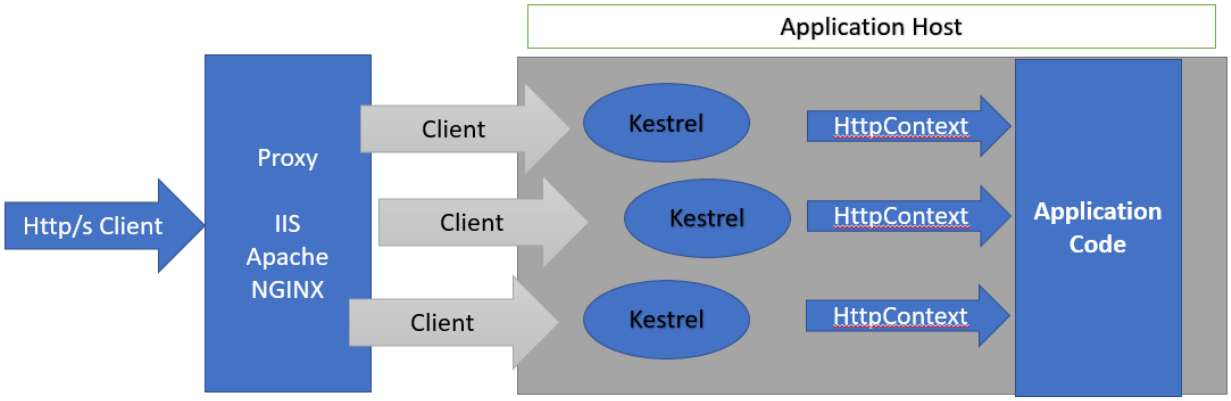
✅ **3. What is ASP.NET Core?**

ASP.NET Core Architecture



ASP.NET Core Architecture





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ASP.NET Core is a **modern, cross-platform framework** for developing **web-based applications** using .NET.

It is the next generation of:

- ASP.NET MVC
- ASP.NET Web API
- ASP.NET Web Pages

Everything is unified into **one programming model** in ASP.NET Core.

3.1 Key Features

✓ Cross-platform

Runs on Windows, Linux, macOS.

✓ High performance

Thanks to Kestrel — one of the fastest web servers.

✓ Open source

Source code available on GitHub.

✓ Modular

Small, fast applications using NuGet packages.

✓ Unified programming model

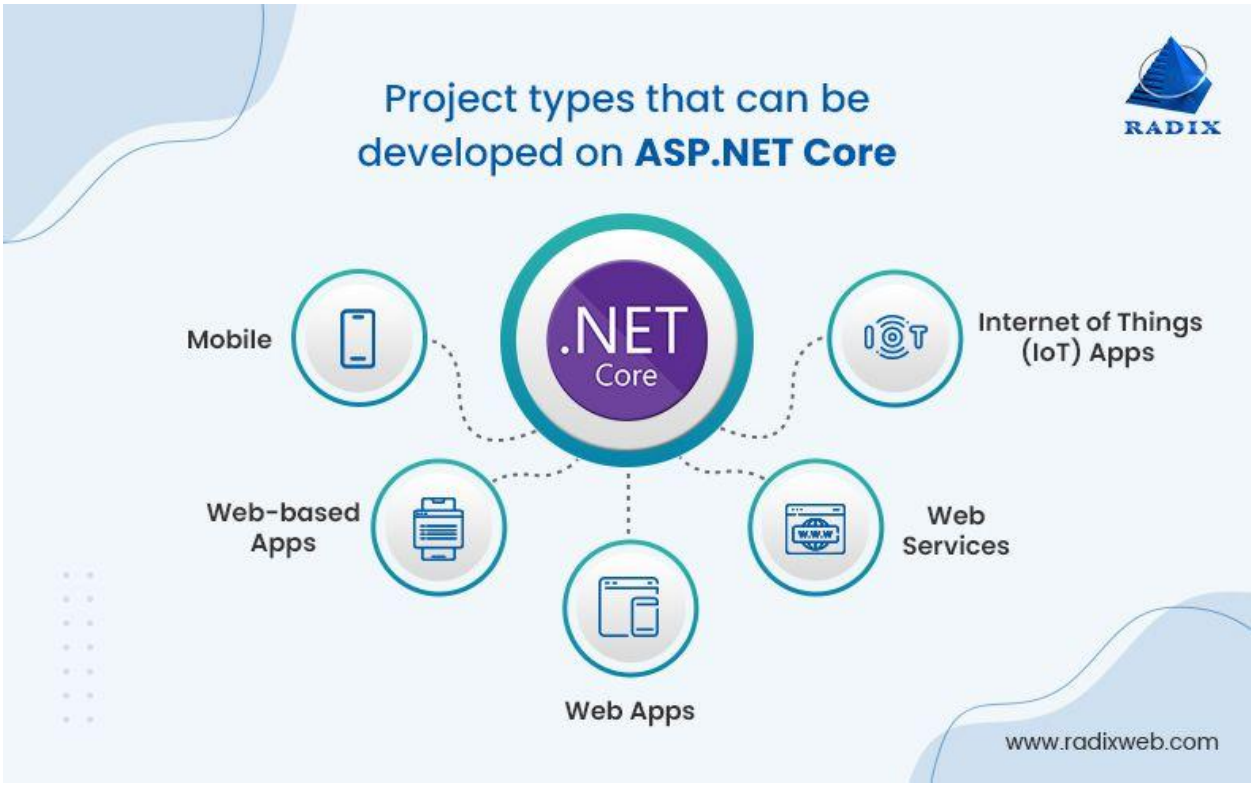
MVC + API + Razor Pages + Blazor all in one framework.

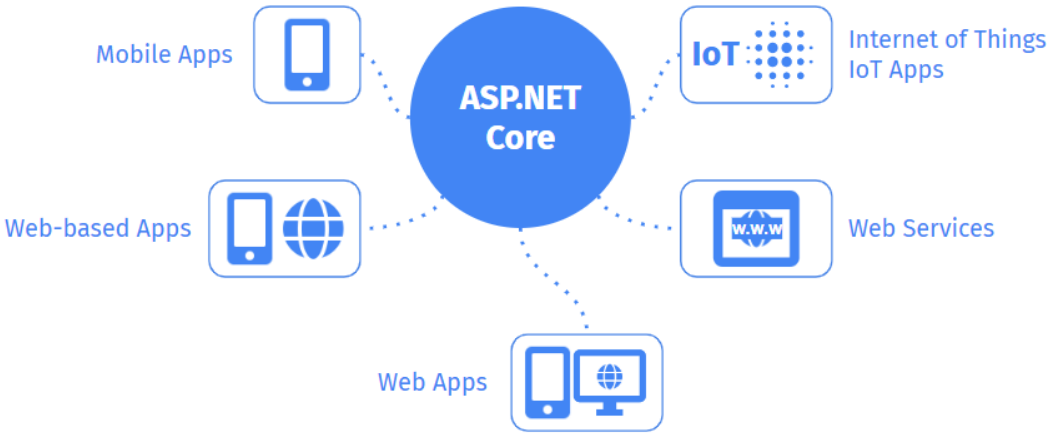
✓ **Built-in Dependency Injection**

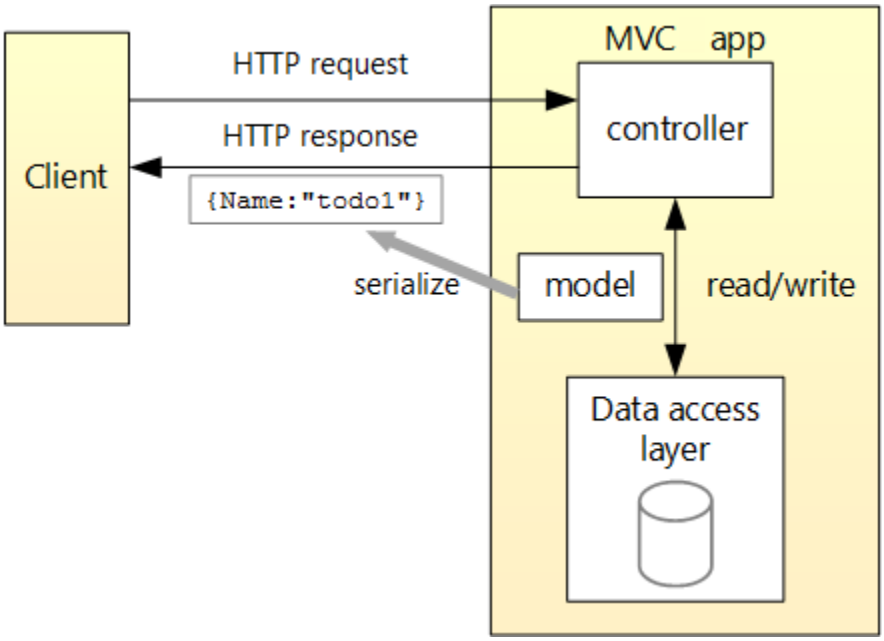
✓ **Middleware pipeline**

Allows customizing request/response processing.

✅ 3.2 Applications You Can Build with ASP.NET Core







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1) Web APIs (Most common)

Used by:

- Angular / React / Vue apps
- Mobile apps
- IoT devices

- 3rd party integrations

2) Modern MVC Web Applications

Server-rendered HTML pages using Razor.

3) Blazor Applications

- Blazor Server
- Blazor WebAssembly (runs in browser without JS)

4) Real-time apps using SignalR

Examples:

- Chat apps
- Live dashboards
- Gaming notifications

5) Minimal APIs

Lightweight endpoints for microservices.

6) gRPC services

High-performance communication in microservices.

7) Background services

Using Hosted services / Worker services.

🎯 **Quick Summary (Easy to Remember)**

.NET

Platform to build applications.

.NET Core

Rebuilt cross-platform version (now called .NET 5+).

Runtime

Needed to **run** applications.

SDK

Needed to **build/develop** applications.

ASP.NET Core

Framework for building **web apps & APIs** using .NET.