.NET Interview Questions and Answers (1–50)

1. What is .NET?

Answer: .NET is a free, open-source, cross-platform framework developed by Microsoft for building a wide range of applications.

2. What is the difference between .NET Framework, .NET Core, and .NET 5/6/7+?

Answer:

- **.NET Framework:** Windows-only, legacy.
- **.NET Core:** Cross-platform, lightweight.
- **.NET 5+ (now just ".NET"):** Unified platform replacing both.

3. What is CLR?

Answer: Common Language Runtime — it executes .NET applications and provides services like memory management and security.

4. What is CTS?

Answer: Common Type System — ensures type safety and cross-language compatibility.

5. What is CLS?

Answer: Common Language Specification — defines rules for language interoperability.

6. What is JIT?

Answer: Just-In-Time compiler — converts MSIL (Intermediate Language) to machine code at runtime.

7. What is the difference between managed and unmanaged code?

Answer:

- **Managed:** Runs under CLR control.
- **Unmanaged:** Runs outside CLR (e.g., native C++).

8. What are assemblies?

Answer: Compiled code libraries used for deployment; include metadata and manifest.

9. What is GAC?

Answer: Global Assembly Cache — stores shared assemblies for reuse.

10. What is a strong name in .NET?

Answer: Unique name for an assembly containing its identity (name, version, culture, public key token).

11. What is an application domain?

Answer: Isolation boundary for security, versioning, and reliability.

12. What is the role of MSIL?

Answer: Intermediate language code compiled by JIT into native machine code.

13. What is NuGet?

Answer: Package manager for .NET used to manage and distribute libraries.

14. What is a .dll and .exe in .NET?

Answer:

- **.dll:** Class library
- **.exe:** Executable application

15. What is MVC in .NET?

Answer: Model-View-Controller — architectural pattern for building web applications.

16. What is Razor in ASP.NET?

Answer: A markup syntax for embedding C# code in HTML pages.

17. What are the different types of .NET applications?

Answer: Web apps, desktop apps, mobile apps, cloud services, games, IoT.

18. What are value types and reference types in .NET?

Answer:

- Value types: stored on the stack
- Reference types: stored on the heap

19. What is the difference between Web Forms and MVC?

Answer:

- Web Forms: Event-driven, stateful
- MVC: Separation of concerns, testable

20. What is ASP.NET Core?

Answer: A high-performance, cross-platform framework for building modern, cloud-based web apps.

21. What are middleware in ASP.NET Core?

Answer: Components in the request pipeline that handle requests and responses.

22. What is dependency injection in .NET?

Answer: Design pattern used to achieve Inversion of Control (IoC) by injecting dependencies at runtime.

23. What is Entity Framework (EF)?

Answer: ORM (Object-Relational Mapper) for .NET to interact with databases using C# objects.

24. What are migrations in EF Core?

Answer: A way to apply schema changes to the database from code.

25. What is LINQ?

Answer: Language Integrated Query — allows querying collections and databases using C# syntax.

26. What is async/await in .NET?

Answer: Enables asynchronous programming, improving responsiveness and performance.

27. What is Kestrel?

Answer: A cross-platform web server used in ASP.NET Core.

28. What is Model Binding?

Answer: Automatically maps form values or route data to action method parameters.

29. What is ViewModel in MVC?

Answer: A class that represents the data passed from the controller to the view.

30. What is routing in ASP.NET Core?

Answer: Maps incoming HTTP requests to controller actions.

31. What are Filters in MVC?

Answer: Attributes that allow code to be run before or after specific stages (e.g., authorization, exception).

32. What is Web API?

Answer: A framework for building HTTP services that can be consumed by browsers and mobile devices.

33. What is the difference between Web API and MVC?

Answer:

- Web API returns data (usually JSON or XML)
- MVC returns HTML views

34. What are tag helpers?

Answer: Enable server-side code to participate in creating and rendering HTML elements in Razor views.

35. What is session management?

Answer: Mechanism to persist user data across multiple requests.

36. What are TempData, ViewData, and ViewBag?

Answer:

- TempData: persists for one request
- ViewData/ViewBag: pass data from controller to view

37. What is SignalR?

Answer: A library for real-time web functionality in ASP.NET apps.

38. What is Blazor?

Answer: A framework for building interactive web UIs with C# instead of JavaScript.

39. What is model validation in .NET?

Answer: Validates user input on both client and server side.

40. What is DataAnnotations?

Answer: Attributes used to define metadata and validations.

41. What is the difference between IEnumerable and IQueryable?

Answer:

- `IEnumerable`: in-memory, LINQ to Objects
- `IQueryable`: database-level execution, LINQ to SQL/EF

42. What is the role of IConfiguration and IOptions in ASP.NET Core?

Answer: Used to read configuration settings and bind them to strongly typed classes.

43. What is Middleware pipeline order?

Answer: Order of middleware registration affects how requests/responses are handled.

44. What is ModelState?

Answer: Contains the state of the model and validation information.

45. What is a custom exception filter?

Answer: Used to handle exceptions globally in a consistent manner.

46. What is .NET Standard?

Answer: A formal specification of .NET APIs for compatibility across all .NET platforms.

47. What is GC.Collect()?

Answer: Forces garbage collection — generally not recommended.

48. What is the difference between IHttpClientFactory and HttpClient?

Answer: `IHttpClientFactory` helps avoid issues with `HttpClient` like socket exhaustion.

49. What is ConfigurationBuilder?

Answer: Used to build configuration sources like appsettings.json, environment variables, etc.

50. What is the difference between synchronous and asynchronous code?

Answer:

- **Synchronous:** Blocking
- **Asynchronous:** Non-blocking, allows multiple operations to run concurrently