Microservices Development with .NET 9

Duration: 10 Days

Target Audience

- .NET Developers
- ASP.NET Core Developers
- Full Stack Developers
- Software Engineers
- Technical Leads
- Developers interested in Microservices, Blazor and AI

Prerequisites

- Basic knowledge of C# and .NET
- Understanding of ASP.NET Core
- Basic knowledge of Web API and REST
- Basic SQL and database concepts
- Basic knowledge of Entity Framework Core
- Basic HTML and CSS knowledge

Module 1: Introduction to Microservices

- Introduction to Microservices
- Monolithic vs Microservices
- Benefits of Microservices
- Microservices Architecture
- Service Boundaries
- Database-per-Service
- Introduction to .NET 9 Microservices
- Creating Microservice Projects

Hands-on

Create a simple E-Commerce Microservices solution

- Product Service
- Customer Service

- Order Service

Module 2: ASP.NET Core Web API

- Introduction to ASP.NET Core Web API
- Controllers and Routing
- HTTP Methods
- Request and Response
- DTOs
- Model Validation
- Dependency Injection
- Middleware
- Exception Handling
- Swagger / OpenAPI
- Health Checks

Hands-on

Develop a Product Web API

- Create Product API
- Implement GET, POST, PUT and DELETE
- Add validation
- Add exception handling
- Test using Swagger

Module 3: EF Core and Dapper

- Introduction to Entity Framework Core
- DbContext and DbSet
- Entity Relationships
- CRUD Operations
- Migrations
- LINQ Queries
- Introduction to Dapper

- Dapper Queries
- Parameterized Queries
- EF Core vs Dapper
- Database-per-Service

Hands-on

Implement Data Access

- Product Service using EF Core
- Order Service using Dapper
- Create database
- Perform CRUD operations

Module 4: Microservices Communication

- Communication Between Microservices
- REST Communication
- HttpClient
- IHttpClientFactory
- Calling Microservices
- Error Handling
- Retry and Timeout
- Introduction to API Gateway
- Introduction to YARP

Hands-on

Connect Microservices

- Order Service calls Product Service
- Check product availability
- Retrieve customer information
- Implement HttpClient

Module 5: Messaging and Event-Driven Architecture

- Introduction to Messaging

- Synchronous vs Asynchronous Communication
- Events
- Publish and Subscribe
- Message Brokers
- Introduction to RabbitMQ
- Introduction to Kafka
- Producers and Consumers
- Queues and Topics
- Eventual Consistency

Hands-on

Implement Order Events

- Create Order
- Publish OrderCreated event
- Consume event
- Send notification from Notification Service

Module 6: Background Services and Hangfire

- Introduction to Background Services
- IHostedService
- BackgroundService
- Worker Services
- Timed Background Tasks
- CancellationToken
- Introduction to Hangfire
- Background Jobs
- Delayed Jobs
- Recurring Jobs
- Job Retry
- Hangfire Dashboard

Hands-on

Create Background Jobs

Implement jobs for:

- Order confirmation
- Invoice generation
- Email notification
- Daily report
- Database cleanup

Module 7: SignalR

- Introduction to Real-Time Communication
- Introduction to SignalR
- SignalR Hubs
- Client Connections
- Sending Messages
- Broadcasting Messages
- Groups
- User Notifications
- SignalR with ASP.NET Core
- SignalR with Microservices

Hands-on

Create Real-Time Order Notifications

- Order Created notification
- Payment Completed notification
- Order Shipped notification
- Order Delivered notification

Module 8: Blazor and PWA

- Introduction to Blazor
- Blazor Architecture
- Razor Components

- Pages and Components
- Routing
- Data Binding
- Events
- Component Communication
- Forms and Validation
- Dependency Injection
- Calling Web APIs
- HttpClient
- Introduction to PWA
- Offline Support

Hands-on

Build a Blazor Microservices Application

Create:

- Product page
- Customer page
- Order page
- Order details
- API integration
- Real-time notifications
- Basic PWA features

Module 9: Security, Redis and Monitoring

Security

- Authentication and Authorization
- JWT Authentication
- Role-Based Authorization
- Securing Web APIs
- CORS

Caching

- Introduction to Caching
- In-Memory Cache
- Redis Cache
- Distributed Caching

Monitoring

- Logging
- Serilog
- Health Checks
- Correlation ID
- Introduction to OpenTelemetry

Hands-on

Secure and Monitor Microservices

- Add JWT authentication
- Secure APIs
- Add Redis caching
- Implement Serilog
- Add health checks

Module 10: AI Integration with .NET 9

AI Fundamentals

- Introduction to Generative AI
- Large Language Models
- Prompts and Tokens
- AI Model Parameters
- Integrating AI with .NET

AI Application

- Creating an AI Service
- AI-powered Web API
- AI Customer Assistant

- AI Product Recommendations
- Calling Microservices from AI

RAG

- Introduction to RAG
- Document Processing
- Chunking
- Embeddings
- Vector Search
- Vector Database

Advanced AI

- Function Calling
- Tool Calling
- Structured Responses
- Introduction to AI Agents

Hands-on

Build an AI Assistant

- Ask product-related questions
- Check order status
- Call internal APIs
- Search documents using RAG
- Implement function/tool calling