

Advanced Software Architecture and Data Management

Duration: 2 Weeks (10 Working Days)

Module 1: Principles of Modern Software Architecture

Objective: Establish foundational architectural principles and Microsoft best practices

Lessons:

- SOLID, DRY, KISS principles in .NET
 - Common .NET architecture patterns (Layered, Clean, Onion)
 - Microsoft-recommended .NET best practices
 - Dependency Injection and Configuration in ASP.NET Core
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Module 2: Architectural Styles in Microsoft Ecosystem

Objective: Compare and apply architectural styles using .NET and Azure

Lessons:

- Monolith vs Microservices: trade-offs and migration
 - Web application architectures in ASP.NET Core
 - Designing Domain-Driven Microservices in .NET
 - Event-driven architecture with Azure Event Grid
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Module 3: Cloud-Native Architecture with Azure

Objective: Design resilient, scalable cloud-native solutions

Lessons:

- Cloud models: IaaS, PaaS, SaaS in Azure
 - Cloud-native design principles (12-factor apps)
 - Multi-cloud and hybrid strategies using Azure Arc
 - Azure Well-Architected Framework overview
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Module 4: Building and Deploying .NET Web APIs

Objective: Develop and deploy RESTful APIs using ASP.NET Core and Azure

Lessons:

- Introduction to ASP.NET Core Web API
 - Building secure and scalable APIs
 - Deploying APIs to Azure App Service and Azure Container Apps
 - Securing APIs with Azure AD and OAuth2
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Module 5: Microservices Communication and Infrastructure

Objective: Implement robust communication and service orchestration

Lessons:

- REST, gRPC, Message Queues (Azure Service Bus)
 - API Gateway (Azure API Management)
 - Service Mesh concepts (Azure Kubernetes Service with Istio)
 - Distributed tracing with Azure Monitor and Application Insights
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Module 6: DevOps and Automation in Architecture

Objective: Automate deployment and infrastructure using Azure DevOps

Lessons:

- CI/CD pipelines with Azure DevOps
 - Infrastructure as Code using Bicep
 - Deployment strategies: Blue-Green, Canary, Rolling
 - GitHub Actions for .NET and Azure
 - Secrets management with Azure Key Vault
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Module 7: Performance Optimization and Caching

Objective: Enhance performance and scalability of .NET applications

Lessons:

- Performance tuning in ASP.NET Core

- Caching strategies: In-memory, Azure Redis Cache
 - Rate limiting and throttling with Azure API Management
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Module 8: Security and Integration Patterns

Objective: Secure systems and integrate with external services

Lessons:

- Zero Trust Architecture fundamentals in Azure
 - Enterprise Integration Patterns using Azure Logic Apps
 - Secure API connectivity with OAuth2 and Azure AD
 - Threat modeling and secure design principles
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Module 9: Azure Data Services Fundamentals

Objective: Understand core Azure data services and roles

Lessons:

- Core data concepts and roles (Data Engineer, Analyst, Architect)
 - Relational data in Azure: Azure SQL, PostgreSQL
 - Non-relational data: Azure Storage, Cosmos DB
 - Data analytics: Azure Synapse, Azure Stream Analytics
 - Data visualization: Power BI integration
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Module 10: Hands-On with Azure Data Tools

Objective: Apply data services in real-world scenarios

Lessons:

- Working with Azure Storage (Blob, Table)
- Working with Cosmos DB (partitioning, indexing)
- Working with Azure SQL
- Building pipelines with Azure Data Factory
- Monitoring data flows with Azure Monitor