Develop AI cloud solutions on Microsoft Azure (MAI200) Training

Duration: **5 Day**

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Overview

This course provides developers with the practical knowledge and skills required to build, monitor, and troubleshoot AI solutions on Microsoft Azure.

Participants learn how to use Azure compute and containerisation approaches to host applications, develop serverless APIs with Azure Functions, and connect Azure services through event-driven and message-based architectures.

The course also examines the Azure data technologies that support modern AI workloads. Participants work with Azure Cosmos DB for NoSQL, Azure Database for PostgreSQL with pgvector, and Azure Managed Redis to implement data storage, caching, streaming, retrieval, and vector search capabilities.

Throughout the programme, developers gain experience in connecting Azure services, orchestrating AI workflows, and applying monitoring and operational best practices. The overall focus is on building AI-driven applications on Azure that are secure, scalable, and observable.

Important Course Scope

This course focuses on the **application architecture and Azure backend technologies** used to support both AI and non-AI workloads.

It does not focus on developing AI models with Azure AI Foundry. Participants specifically looking for AI model development and Azure AI Foundry training should consider dedicated courses covering those technologies.

Prerequisites

Participants should have:

- Basic application development experience using Python, .NET, JavaScript, or another general-purpose programming language
- A foundational understanding of cloud computing concepts, including compute, storage, and networking
- Awareness of containerisation concepts such as Docker images, registries, and the container lifecycle
- Familiarity with Azure fundamentals, including Resource Groups, identity, and Azure Resource Manager services
- Experience working with the command line and Azure CLI
- A basic understanding of REST APIs and event-driven architectures
- Some experience with databases such as NoSQL or PostgreSQL is recommended

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Who Should Attend

This course is designed for:

- Developers building backend or AI-driven applications on Microsoft Azure
- Developers seeking practical experience with containerised compute, event-driven architectures, AI data services, and secure application development on Azure

What You Will Learn

By completing this course, participants will be able to:

- Manage container images and build workflows with Azure Container Registry
- Deploy and manage containerised applications with Azure App Service, Azure Container Apps, and Azure Kubernetes Service
- Configure container scaling, application settings, and monitoring across Azure compute services
- Build and query AI-oriented data solutions using Azure Cosmos DB for NoSQL and Azure Database for PostgreSQL
- Implement vector search and retrieval patterns for AI applications
- Use Azure Managed Redis for caching, messaging, and vector search workloads
- Create event-driven architectures with Azure Service Bus and Azure Event Grid
- Build serverless APIs and integrations using Azure Functions
- Secure application configuration using Azure Key Vault and Azure App Configuration
- Implement observability with OpenTelemetry and Azure Monitor

Outline

1. Store and Manage Containers with Azure Container Registry

- Core Azure Container Registry concepts
- Working with registries, repositories, and artifacts
- Building and running container images with ACR Tasks
- Tagging and versioning container images
- **Exercise:** Build and manage a container image using ACR Tasks

2. Deploy Containers to Azure App Service

- Deploying containers to Azure App Service
- Configuring container runtime behaviour
- Managing application settings
- Observing and troubleshooting containerised applications
- **Exercise:** Deploy a container to Azure App Service

3. Deploy Containers to Azure Container Apps

- Exploring Container Apps environments
- Deploying a container app with Azure CLI and YAML
- Configuring runtime settings with environment variables and secrets

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- Configuring image pull authentication for private registries
- Validating deployments through logs and status information
- **Exercise:** Deploy a containerised backend API to Container Apps

4. Manage Containers in Azure Container Apps

- Updating images and managing revisions
- Managing the container app lifecycle
- Monitoring logs and troubleshooting problems
- Configuring health probes and diagnosing failures
- Optimising container resources and scaling
- **Exercise:** Diagnose and resolve a failed deployment

5. Scale Containers in Azure Container Apps

- Configuring scale rules for container workloads
- Implementing event-driven scaling with KEDA
- Applying KEDA scalers to custom workloads
- Selecting compute resources based on cost and performance requirements
- Using revision modes for traffic management
- **Exercise:** Configure autoscaling with KEDA triggers

6. Deploy Applications to Azure Kubernetes Service

- Creating Kubernetes deployment manifests
- Exposing applications through Kubernetes Services
- Deploying applications to Azure Kubernetes Service
- **Exercise:** Deploy an AI inference API to Azure Kubernetes Service

7. Configure Applications on Azure Kubernetes Service

- Defining ConfigMaps for application settings
- Using Secrets to protect sensitive information
- Connecting persistent storage to applications
- **Exercise:** Configure applications on Azure Kubernetes Service

8. Monitor and Troubleshoot Applications on Azure Kubernetes Service

- Monitoring application logs and metrics
- Troubleshooting Pods and Services
- Validating service connectivity and endpoints
- **Exercise:** Troubleshoot applications running on Azure Kubernetes Service

9. Build Queries with Azure Cosmos DB for NoSQL

- Exploring Azure Cosmos DB for NoSQL
- Connecting to Azure Cosmos DB through the SDK
- Performing data operations on items
- Writing queries to retrieve document data
- **Exercise:** Create a RAG document store with Azure Cosmos DB for NoSQL

10. Implement Vector Search with Azure Cosmos DB for NoSQL

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- Storing and retrieving vector embeddings
- Running vector similarity queries
- Combining vector search with metadata filtering
- Using Change Feed to refresh embeddings
- **Exercise:** Build a semantic search application using Azure Cosmos DB for NoSQL

11. Optimise Azure Cosmos DB Query Performance

- Understanding Azure Cosmos DB indexing
- Configuring range and composite indexes
- Tuning vector indexes for embedding workloads
- Reducing RU costs through appropriate indexing strategies
- Selecting suitable consistency levels
- **Exercise:** Optimise query performance using vector indexes

12. Build and Query with Azure Database for PostgreSQL

- Exploring Azure Database for PostgreSQL
- Connecting to PostgreSQL databases
- Creating and managing schemas
- Querying relational data
- Integrating database access with application code
- **Exercise:** Build an agent tool backend using Azure Database for PostgreSQL

13. Implement Vector Search with Azure Database for PostgreSQL

- Storing and querying embeddings with pgvector
- Performing vector similarity searches
- Managing vector indexes and embedding updates
- Implementing retrieval patterns for AI applications
- **Exercise:** Implement vector search using Azure Database for PostgreSQL

14. Optimise Vector Search in Azure Database for PostgreSQL

- Tuning PostgreSQL for pgvector workloads
- Selecting and configuring vector indexes
- Optimising database data layout
- Scaling for high-volume workloads
- Optimising connection management
- **Exercise:** Optimise vector search performance

15. Implement Data Operations in Azure Managed Redis

- Exploring Azure Managed Redis capabilities
- Working with client libraries and development best practices
- Implementing data storage and retrieval
- **Exercise:** Perform data operations using Azure Managed Redis

16. Implement Event Messaging with Azure Managed Redis

- Publishing and subscribing with Redis Pub/Sub
- Building task queues with Redis Streams
- Selecting between broadcast and coordinated messaging approaches

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- **Exercise:** Publish and subscribe to events with Azure Managed Redis

17. Implement Vector Storage in Azure Managed Redis

- Indexing and querying vector data
- Selecting vector types and indexing approaches
- Optimising Redis data structures for vector workloads
- **Exercise:** Implement semantic search with Azure Managed Redis

18. Queue and Process AI Operations with Azure Service Bus

- Azure Service Bus messaging concepts
- Working with queues, topics, and subscriptions
- Structuring messages for AI workloads
- Implementing reliable message processing
- **Exercise:** Process messages using Azure Service Bus

19. Develop Event-Driven AI Workflows with Azure Event Grid

- Azure Event Grid concepts and event-driven architecture
- Working with event schemas and properties
- Configuring delivery and retry policies
- Publishing custom events from AI applications
- **Exercise:** Publish and receive events with Azure Event Grid

20. Build Serverless AI Backends with Azure Functions

- Azure Functions hosting and scaling
- Preparing a local development environment
- Creating triggers and bindings for AI integrations
- Managing secrets and configuration
- Configuring identity and access
- **Exercise:** Create an MCP server with Azure Functions

21. Manage Application Secrets with Azure Key Vault

- Storing and organising secrets, keys, and certificates
- Retrieving secrets through SDK client libraries
- Implementing secret versioning and rotation
- Applying caching strategies to secret retrieval
- **Exercise:** Manage application secrets using Azure Key Vault

22. Manage Application Settings with Azure App Configuration

- Connecting applications to Azure App Configuration
- Organising settings with labels and feature flags
- Referencing secrets stored in Azure Key Vault
- Selecting suitable configuration storage strategies
- **Exercise:** Retrieve settings and secrets through Azure App Configuration

23. Instrument Applications with OpenTelemetry

- Understanding OpenTelemetry and observability concepts

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- Adding the OpenTelemetry SDK to applications
- Configuring spans and traces
- Exporting telemetry to Azure Monitor
- Debugging distributed application flows
- **Exercise:** Instrument an application using OpenTelemetry

24. Analyse Application Telemetry with Logs and Metrics

- Writing KQL queries for Application Insights
- Analysing logs to identify errors and performance patterns
- Building application monitoring dashboards
- Creating workbooks for interactive analysis
- Configuring alerts for failures and anomalies
- **Exercise:** Query application logs using KQL

Exams and Assessments

This course is designed to support learners preparing for the **AI-200 examination**.

The AI-200 examination is available separately from the training course.