Mastering Model Context Protocol for Agentic AI

Duration: 16 Hours

Pre-requisites

- Working knowledge of Python
- Basic understanding of Large Language Models (LLMs)

Tools & Platforms

- Python 3.13 or above
- Visual Studio Code (VS Code)
- Claude Desktop App

Module 1: MCP Foundations and Ecosystem

- Context management in modern LLM systems
- Fragmentation across AI tools and platforms
- Protocol-based interoperability for AI systems
- MCP positioning within the AI ecosystem
- Open standard philosophy and ecosystem growth

Module 2: MCP Architecture and Roles

- End-to-end MCP interaction model
- Host, Client, and Server responsibilities
- Client–Server decoupling model

Module 3: MCP Primitives and Capability Model

- Tools as executable operations
- Resources as structured data interfaces
- Prompts as reusable instruction artifacts
- Capability exposure and discovery
- Capability negotiation and constraints

Module 4: MCP Protocol and Data Layer (JSON-RPC 2.0)

- RPC-based communication paradigm
- JSON-RPC request and response structure
- Notifications and batching
- Error objects and standardized error codes

Module 5: MCP Transport and Lifecycle

- Transport abstraction in MCP
- Local communication using STDIO
- Remote communication using HTTP

- Server-Sent Events (SSE) for streaming responses
- Initialization handshake
- Version and capability negotiation

Module 6: MCP Server Development (Standard & FAST MCP)

- MCP server responsibilities
- Standard MCP server implementation
- FAST MCP architecture and philosophy
- Performance-oriented server design
- Tool, resource, and prompt registration

Module 7: MCP Client Integration and Execution Flow

- MCP client responsibilities
- Request orchestration and tool execution
- Integration with existing AI clients
- Connector-based integrations

Module 8: Cloud Deployment, Security, and Production Patterns

- Cloud-hosted MCP server architecture
- MCP deployment on Azure
- Authentication and authorization strategies

QnA and Quiz