

MCP for Agentic AI: JSON-RPC & FastMCP Servers

Learn to design, build and deploy MCP servers and clients using JSON-RPC and FastMCP for interoperable agentic AI systems.

16 Hours

DURATION

8

MODULES

35

TOPICS

COURSE OVERVIEW

This course covers the role of the Model Context Protocol within the AI ecosystem, its architecture of hosts, clients and servers, and its core primitives of tools, resources and prompts. It examines the JSON-RPC 2.0 data layer, including request and response structures, notifications, batching and error handling, alongside transport options such as STDIO, HTTP and Server-Sent Events and the initialization handshake. It then addresses building standard and FastMCP servers, integrating MCP clients with existing AI tools, and deploying, securing and authorizing MCP servers in cloud environments such as Azure.

WHO THIS COURSE IS FOR

AI Engineers

Backend Developers

Solutions Architects

Cloud Engineers

Integration Developers

PREREQUISITES

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

TOOLS AND REQUIREMENTS

Tools & Platforms

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

LEARNING OBJECTIVES

- Explain how MCP addresses context management and tool fragmentation
- Describe the roles of Host, Client and Server in MCP
- Identify MCP primitives such as tools, resources and prompts
- Apply JSON-RPC 2.0 structures for requests, responses and errors
- Compare transport options such as STDIO, HTTP and SSE
- Implement standard and FastMCP servers with capability registration
- Develop MCP client integrations with existing AI tools
- Plan cloud deployment and security for MCP servers on Azure

8 Modules, 35 Topics

01

MCP Foundations and Ecosystem

TOPICS

- 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

02

MCP Architecture and Roles

TOPICS

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

03

MCP Primitives and Capability Model

TOPICS

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

04

MCP Protocol and Data Layer (JSON-RPC 2.0)

TOPICS

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

05

MCP Transport and Lifecycle

TOPICS

- 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

06

MCP Server Development (Standard & FAST MCP)

TOPICS

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

07

MCP Client Integration and Execution Flow

TOPICS

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

08

Cloud Deployment, Security, and Production Patterns

TOPICS

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

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

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