

Building MCP Servers with C

Connect AI Agents to Your .NET Applications with the Model Context Protocol

The Model Context Protocol (MCP) is quickly becoming the standard way for AI models to talk to external tools, data, and services. Anthropic announced it late 2024, and Microsoft, OpenAI, Google, and others all jumped on board pretty quickly. It gives a universal protocol so AI agents can call into code: reading databases, calling APIs, accessing files, whatever is needed. People like to call it "USB-C for AI."

This book teaches .NET developers how to build MCP servers using the official C# SDK (ModelContextProtocol on NuGet). Start with the basics, learn how the protocol works, prepare the dev environment, then build increasingly complex servers. The book walks through the three MCP primitives: tools (functions the AI can call), resources (data the AI can read), and prompts (reusable templates), with examples you can actually run as you go.

GitHub Copilot, Claude, ChatGPT, and other AI assistants are adding MCP support right now. If you can build MCP servers, your code and APIs become accessible to every major AI platform at once. Readers build a complete capstone project that ties together tools, resources, prompts, DI, database integration, and deployment. The last chapters cover enterprise stuff like auth, resilience, and observability, plus getting it running with Docker, Azure, and CI/CD. So you can actually ship what you build.

What You Will Learn

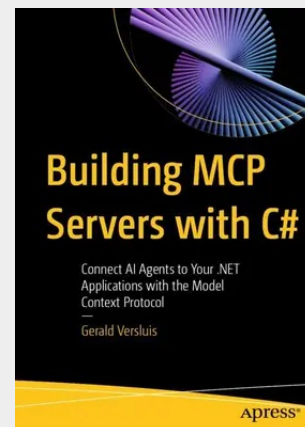
- Understand how MCP works architecturally. Learn how hosts, clients, and servers communicate with JSON-RPC 2.0, how capability negotiation works, and what the transport layers do.
- Build MCP tools with the C# SDK. Create tools with typed parameters, async execution, progress reporting, and proper error handling using the official ModelContextProtocol NuGet package.
- Expose data through MCP resources. Serve static and templated resources with proper URI schemes and MIME types so AI models can read your application data.
- Create reusable prompt templates. Build parameterized prompts with multiple messages that guide AI behavior and can be shared across teams.
- Pick the right transport layer. Understand when to use stdio vs Streamable HTTP and implement both with ASP.NET Core.
- Use proper .NET patterns in MCP servers. Use dependency injection, IOption configuration, structured logging, HttpClientFactory, the same patterns you'd use in any production ASP.NET Core app.
- Deploy MCP servers for real. Containerize with Docker, publish as .NET tools on NuGet, deploy to Azure, and set up CI/CD with GitHub Actions.

Who This Book is For

This book is for any .NET developers seeking to use Model Context Protocol to develop intelligent applications.

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58,84 €

54,99 € (zzgl. MwSt.)

vorbestellbar, Erscheinungstermin ca. Dezember 2026

Artikelnummer: 9798868830099

Medium: Buch

ISBN: 979-8-8688-3009-9

Verlag: APRESS L.P.

Erscheinungstermin: 11.12.2026

Sprache(n): Englisch

Auflage: 1. Auflage 2026

Produktform: Kartoniert

Seiten: 307

Format (B x H): 178 x 254 mm

