

Lab 012: What is MCP? Anatomy of the Protocol

Level: L100 Path: ? MCP Time: ~20 min ? Cost: Free ? No account needed

What You'll Learn

What MCP is and why it was created The three MCP primitives: Tools, Resources, and Prompts

MCP transport options: stdio vs HTTP/SSE How to explore MCP servers with the MCP Inspector

How MCP integrates with GitHub Copilot, Foundry, Claude, and other agents

Introduction

The problem MCP solves

Before MCP, if you wanted to connect an AI agent to a database, you had to write custom integration code for every combination of agent + data source. $N \text{ agents} \times M \text{ data sources} = N \times M$ custom integrations.

MCP solves this with a standard protocol:

MCP Architecture

MCP was created by Anthropic in 2024 and quickly adopted by Microsoft, OpenAI, Google, and others as the industry standard.

The Three MCP Primitives

1. ? Tools

Functions the LLM can call ? the most common primitive.

[diagram or code sample]

The LLM reads the description and decides when to call this tool.

2. ? Resources

Data the LLM can read ? like files, URLs, or database records.

[diagram or code sample]

3. ? Prompts

Reusable prompt templates the LLM can use.

[diagram or code sample]

Transport Options

MCP communicates over two transports:

Transport | Use case | How it works | stdio | Local tools, CLI agents | Parent process spawns MCP server as child; communicates via stdin/stdout | HTTP/SSE | Remote servers, cloud agents | MCP server exposes HTTP endpoints; agent connects via Server-Sent Events | In this hub's labs, we use HTTP/SSE so cloud-hosted agents (like Foundry Agent Service) can reach your MCP server.

MCP Message Flow

When an agent calls a tool, here's what happens:

[diagram or code sample]

Using the MCP Inspector

The MCP Inspector is a browser-based tool for exploring any MCP server without writing code.

tip "Try it now ? no install needed" Run this command (requires Node.js): [diagram or code sample] Or visit inspector.modelcontextprotocol.io in your browser.

With the inspector you can:

Connect to any MCP server (local or remote) Browse available tools, resources, and prompts

Call tools manually and see the JSON responses Debug your own MCP servers

MCP in the Microsoft Ecosystem

Product | MCP support | GitHub Copilot (VS Code) | ? Connect MCP servers in

.vscode/mcp.json | Microsoft Foundry Agent Service | ? Connect MCP servers as agent tools |

Semantic Kernel | ? MCP plugin adapter available | Claude Desktop | ? Native MCP support |

Azure MCP Server | ? Microsoft-hosted MCP server for Azure services |

VS Code MCP configuration (.vscode/mcp.json)

[diagram or code sample]

Once configured, GitHub Copilot in VS Code can call your MCP server's tools from chat.

Summary

MCP is an open standard that lets any AI agent connect to any tool or data source via a consistent protocol. It has three primitives (Tools, Resources, Prompts) and two transports (stdio and HTTP/SSE). The MCP Inspector lets you explore servers without writing code.

Next Steps

Ready to build your own MCP server?

Python: ? Lab 020 ? Build an MCP Server in Python C#: ? Lab 021 ? Build an MCP Server in C#

Phase 3 modernization

warning "Verified 2026-10-27" Target MCP specification 2026-07-28. Prefer stateless server design, capability discovery, current Tier 1 SDKs, and explicit multi-round-trip state. Add Registry and authorization only where the trust model requires them.

[diagram or code sample]

Model Context Protocol specification MCP authorization MCP Registry

Supporting kit

The site build generates stable PDF and ZIP downloads. The ZIP contains the lab guide and every supporting file declared for this lab.

Download generated PDF Download generated ZIP

Supporting file: CHEATSHEET.md

Supporting files: Lab 012: What is MCP? Anatomy of the Protocol

Start with the documented local or free path. Record assumptions and validation evidence.

Keep hosted services optional unless the lab marks them required.

Supporting file: README.md

Lab 012: What is MCP? Anatomy of the Protocol

Use these files with the lab guide and generated kit.