

ANTHROPIC

CONTEXT PROTOCOL

Course Overview

Introduction

- Welcome to the course
- Introducing MCP
- MCP clients

Hands-on with MCP servers

- Project setup
- Defining tools with MCP
- The server inspector
- Course satisfaction survey

Connecting with MCP clients

- Implementing a client
- Defining resources
- Accessing resources
- Defining prompts
- Prompts in the client

Defining tools with MCP

AI Open in Claude

Our MCP Server

Tool to read a doc

Tool to update a doc

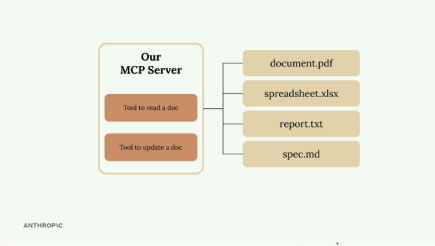
document.pdf

spreadsheet.xlsx

report.txt

spec.md

Building an MCP server becomes much simpler when you use the official Python SDK. Instead of writing complex JSON schemas by hand, you can define tools with decorators and let the SDK handle the heavy lifting.



In this example, we're creating a document management server with two core tools: one to read documents and another to update them. All documents

Setting Up the MCP Server

The Python MCP SDK makes server creation straightforward. You can initialize a server with just one line:

```
from mcp.server.fastmcp import FastMCP

mcp = FastMCP("DocumentMCP", log_level="ERROR")
```

Your documents can be stored in a simple dictionary structure:

```
docs = {
    "deposition.md": "This deposition covers the testimony of Angela Smith, P.E.",
    "report.pdf": "The report details the state of a 20m condenser tower.",
    "financials.docx": "These financials outline the project's budget and expenses.",
    "outlook.pdf": "This document presents the projected future performance of the project.",
    "plan.md": "The plan outlines the steps for the project's implementation.",
    "spec.txt": "These specifications define the technical requirements for the project."
}
```

Tool Definition with Decorators

The SDK uses decorators to define tools. Instead of writing JSON schemas manually, you can use Python type hints and field descriptions. The SDK automatically generates the proper schema that Claude can understand.

Creating a Document Reader Tool

The first tool reads document contents by ID. Here's the complete implementation:

```
@mcp.tool(
    name="read_doc_contents",
    description="Read the contents of a document and return it as a string."
)
def read_document(
    doc_id: str = Field(description="Id of the document to read")
):
    if doc_id not in docs:
        raise ValueError(f"Doc with id {doc_id} not found")

    return docs[doc_id]
```

The decorator specifies the tool name and description, while the function parameters define the required arguments. The `Field` class from Pydantic provides argument descriptions that help Claude understand what each parameter expects.

Building a Document Editor Tool

Building a Document Editor Tool

The second tool performs simple find-and-replace operations on documents:

```
@mcp.tool(
    name="edit_document",
    description="Edit a document by replacing a string in the documents content"
)
def edit_document(
    doc_id: str = Field(description="Id of the document that will be edited"),
    old_str: str = Field(description="The text to replace. Must match exactly,"),
    new_str: str = Field(description="The new text to insert in place of the old")
):
    if doc_id not in docs:
        raise ValueError(f"Doc with id {doc_id} not found")

    docs[doc_id] = docs[doc_id].replace(old_str, new_str)
```

This tool takes three parameters: the document ID, the text to find, and the replacement text. The implementation includes error handling for missing documents and performs a straightforward string replacement.

Key Benefits of the SDK Approach

- No manual JSON schema writing required
- Type hints provide automatic validation
- Clear parameter descriptions help Claude understand tool usage
- Error handling integrates naturally with Python exceptions
- Tool registration happens automatically through decorators

The MCP Python SDK transforms tool creation from a complex schema-writing exercise into simple Python function definitions. This approach makes it much easier to build and maintain MCP servers while ensuring Claude receives properly formatted tool specifications.