Connecting Tools to AI

MGMT 675: Generative AI for Finance

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The Problem: Isolated AI

Claude Desktop is powerful—but out of the box, it can only read and write text. It cannot control your browser, run terminal commands, or interact with other software.

- Want Claude to fill out a web form? It can't reach your browser.
- Want Claude to run a shell command? It has no terminal access.
- Want Claude to query a database? It has no connection.
- **MCP servers solve this problem.**

What is MCP?

The **Model Context Protocol (MCP)** is an open standard that lets AI applications connect to external tools and data sources through a uniform interface.

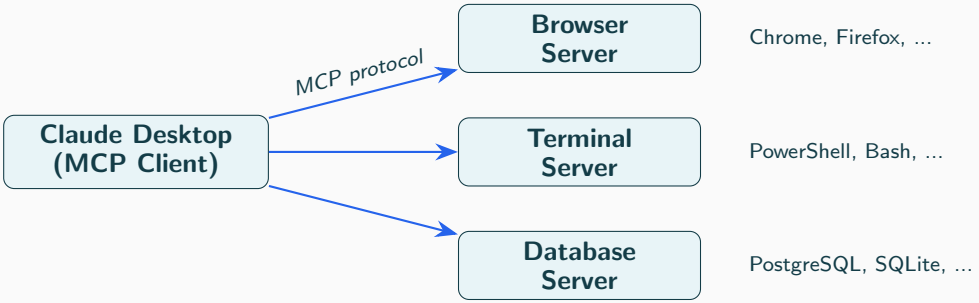
The Idea

- A standard "plug-in" protocol
- AI app connects to MCP servers
- Each server provides specific tools
- Tools appear automatically in the AI

Analogy

- USB is a standard for peripherals
- Plug in a keyboard, it just works
- MCP is a standard for AI tools
- Connect a server, tools just appear

How MCP Works



- Claude Desktop is the **client**; each external service runs as a **server**
- Servers expose **tools** (functions the AI can call) via a standard protocol
- You can connect multiple servers at once

Connecting an MCP Server in Claude Desktop

Two Ways to Install MCP Servers

Desktop Extensions (Easy)

1. Open Claude Desktop
2. Go to **Settings** → **Extensions**
3. Click **Browse extensions**
4. Find the server you want
5. Click **Install**

One-click install. Anthropic-reviewed.

Manual Configuration

1. Install prerequisites (next slide)
2. Edit a JSON config file
3. Specify the server command
4. Restart Claude Desktop
5. Tools appear automatically

More control. Works with any server.

Prerequisites: Node.js and uv

MCP servers are distributed as Node.js or Python packages. You need one or both installed depending on which servers you use.

Node.js (for `npx` servers)

- Download the **LTS** installer from `https://nodejs.org`
- Run the installer (includes `npm` and `npx`)
- Verify: open a terminal and type `node --version`

Used by: DesktopCommander, FMP

uv (for `uvx` servers)

- **Mac**: run in Terminal:
  `brew install uv`
- **Windows**: run in PowerShell:
  `winget install astral-sh.uv`
- Verify: `uvx --version`

Used by: Browser-Use, Alpha Vantage

Install these before configuring any MCP server. `uv` also installs Python if you don't have it.

Config File Location

For manual installation, edit the Claude Desktop configuration file:

macOS

```
~/Library/Application Support/
Claude/claude_desktop_config.json
```

Windows

```
%APPDATA%\Claude\
claude_desktop_config.json
```

- Create the file if it doesn't exist
- The file defines which MCP servers to launch when Claude Desktop starts
- After editing, **fully quit and restart** Claude Desktop

Config File Structure

Example: Adding Two MCP Servers

```
{
  "mcpServers": {
    "my-server-1": {
      "command": "npx",
      "args": ["-y", "some-mcp-package"]
    },
    "my-server-2": {
      "command": "uvx",
      "args": ["another-mcp-package"]
    }
  }
}
```

- Each server has a name, a command, and arguments
- `npx` runs Node.js packages; `uvx` runs Python packages

Verifying the Connection

1. Restart Claude Desktop after editing the config file
2. Look for the **hammer icon** in the chat input area
3. Click it to see the list of available tools from your servers
4. If a server fails to start, check the logs:
   - macOS: `~/Library/Logs/Claude/mcp*.log`
   - Windows: `%APPDATA%\Claude\logs\mcp*.log`

When Claude wants to use a tool, it will ask for your **permission** before executing. You stay in control.

Browser-Use: AI-Driven Browser Automation

What is Browser-Use?

Browser-Use is an MCP server that lets Claude autonomously control a web browser. You describe a task in plain English, and it handles the navigation, clicking, and typing.

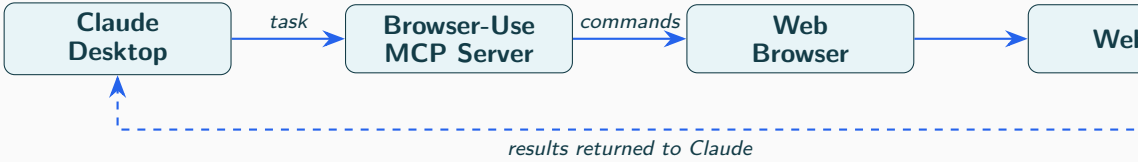
Example Tasks

- "Fill out the application form on this page with my information"
- "Download all linked CSV files from this page"
- "Search for AAPL on Yahoo Finance and get the P/E ratio"

Key Features

- Plain-language task descriptions
- Navigates pages autonomously
- Fills forms, clicks buttons
- Extracts data from web pages
- Works on Mac and Windows

How Browser-Use Works



- Claude sends a high-level task (e.g., "fill out this form")
- Browser-Use translates the task into browser actions (click, type, scroll)
- Results (extracted text, confirmation, screenshots) return to Claude

Browser-Use: Two Deployment Options

Cloud (Hosted)

- No local setup required
- Browser runs on their servers
- **10-step limit per task**
- Requires a Browser-Use API key
- Persistent login profiles available

Local (Self-Hosted)

- Browser runs on your machine
- No step limits
- Requires your own LLM API key
- Full privacy—data stays local
- **Recommended for most users**

Docs: https://docs.browser-use.com/customize/integrations/mcp-server

Installing Browser-Use

Add to Claude Desktop Config

```
"browser-use": {
  "command": "uvx",
  "args": ["--from", "browser-use[cli]",
           "browser-use", "--mcp"],
  "env": {
    "ANTHROPIC_API_KEY": "sk-ant-..."
  }
}
```

- **Prerequisite**: `uv` installed and Chrome/Chromium on your machine
- The `[cli]` extra is required—without it, the MCP server won't start
- `ANTHROPIC_API_KEY`: Browser-Use calls an LLM to decide how to navigate pages, so it needs its own API key (Anthropic or OpenAI)
- Restart Claude Desktop after editing the config; a browser window will open when Claude uses the tool

Browser-Use: Strengths and Limitations

Strengths

- Natural language task descriptions
- No need to write selectors or scripts
- Form filling is a primary use case
- Handles multi-step workflows
- Cross-platform (Mac, Windows, Linux)

Limitations

- AI-driven: can be unpredictable on complex pages
- Local version needs an LLM API key (adds cost per action)
- Newer project, smaller community
- May struggle with heavily dynamic sites

DesktopCommanderMCP: Terminal Control

What is DesktopCommanderMCP?

DesktopCommanderMCP is an MCP server that gives Claude Desktop the ability to execute terminal commands, manage files, and control processes on your computer.

Example Tasks

- "Run `pip install pandas`"
- "Show me all Python files in this folder"
- "Start a Jupyter notebook server"
- "Check if port 8080 is in use"

Key Features

- Execute terminal commands
- Read, write, and search files
- Manage running processes
- Diff-based file editing
- Works on Mac, Windows, and Linux

Why Give Claude a Terminal?

- **Software installation**: "Install the Python libraries I need for this project"
- **Data processing**: "Convert all the .xlsx files in this folder to .csv"
- **Git operations**: "Initialize a git repo, commit my changes, and push"
- **System administration**: "Show disk usage" or "List running processes"
- **Development**: "Run my test suite and tell me what failed"

With DesktopCommander, Claude Desktop can do much more than chat—it becomes an active tool on your computer.

Installing DesktopCommanderMCP

Add to Claude Desktop Config

```
"desktop-commander": {
  "command": "npx",
  "args": ["-y", "desktop-commander-mcp"]
}
```

- **Prerequisite**: Node.js (LTS) installed
- `npx -y` downloads and runs the package automatically—no separate install step
- No API keys needed—everything runs locally
- Restart Claude Desktop after editing the config
- Claude will ask permission before running each command

GitHub: https://github.com/wonderwhy-er/DesktopCommanderMCP

DesktopCommanderMCP: Tools Available

Tool	Description
execute_command	Run a terminal command
read_file	Read file contents
write_file	Create or overwrite a file
edit_block	Make targeted edits using diff blocks
search_files	Search file contents with regex
list_directory	List files and folders
get_file_info	Get file metadata (size, dates)
list_processes	Show running processes
kill_process	Stop a running process

DesktopCommanderMCP: Strengths and Limitations

Strengths

- Full terminal access
- File operations built in
- Process management
- Well-established, large community
- Cross-platform (Mac, Windows, Linux)
- No API keys needed (runs locally)

Limitations

- Powerful = potentially dangerous
- A bad command could delete files or break your system
- Always review commands before approving
- No built-in sandboxing

Always review terminal commands before clicking "Allow"—Claude asks permission for a reason.

Financial Data Servers

MCP Servers for Financial Data

Alpha Vantage

- 115+ tools: stock prices, options, forex, crypto, economic indicators, 50+ technical indicators
- Free API key at https://www.alphavantage.co
- **Free tier**: 25 requests/day, 5/minute, last 100 data points per request
- Paid: from $49.99/month

Financial Modeling Prep

- 253+ tools: financial statements, fundamentals, SEC filings, earnings, ESG scores, insider trading
- Free API key at https://financialmodelingprep.com
- **Free tier**: 250 requests/day, 5 years of annual data, 500 MB/month
- Some endpoints are paid-only

Installing Financial Data Servers

Alpha Vantage

```
"alphavantage": {
  "command": "uvx",
  "args": ["av-mcp", "YOUR_API_KEY"]
}
```

Prerequisite: `uv` installed. Get a free API key at https://www.alphavantage.co/support/#api-key

Financial Modeling Prep

```
"financial-modeling-prep": {
  "command": "npx",
  "args": ["-y", "@houtini/fmp-mcp"],
  "env": { "FMP_API_KEY": "YOUR_API_KEY" }
}
```

Putting It All Together

Combining Multiple MCP Servers

You can connect multiple MCP servers at once. Claude sees all their tools and can use them together in a single conversation.

Example Combination

- **Browser-Use**: navigate to a website and download data
- **DesktopCommander**: run a Python script to process the data
- **Result**: end-to-end automation with no manual steps

Other Popular Servers

- **Filesystem**: sandboxed file access
- **PostgreSQL/SQLite**: database queries
- **GitHub**: pull requests, issues
- **Slack**: send messages
- Browse all: `https://github.com/modelcontextprotocol/servers`

Example: Multiple Servers in One Config

All entries go inside `"mcpServers": { ... }`

```
{
  "mcpServers": {
    "browser-use": {
      "command": "uvx",
      "args": ["--from", "browser-use[cli]",
               "browser-use", "--mcp"],
      "env": {"ANTHROPIC_API_KEY": "sk-ant-..."}
    },
    "desktop-commander": {
      "command": "npx",
      "args": ["-y", "desktop-commander-mcp"]
    },
    "alphavantage": {
      "command": "uvx",
      "args": ["av-mcp", "YOUR_AV_KEY"]
    }
```

Troubleshooting MCP Servers

MCP servers can be finicky to set up. If tools don't appear after restarting Claude Desktop, work through this checklist:

1. **Validate your JSON**: a missing comma or extra comma will silently break the config. Paste your config into `https://jsonlint.com` to check.
2. **Check prerequisites**: run `node --version` and `uvx --version` in a terminal. If either is "not found," install it first.
3. **Fully quit Claude Desktop**: on Mac, `Cmd+Q`; on Windows, right-click the system tray icon and **Quit**. Simply closing the window is not enough.
4. **Look for the hammer icon**: after restarting, click the hammer icon in the chat box to see if tools loaded.
5. **Check the logs**:
   - Mac: `~/Library/Logs/Claude/mcp*.log`
   - Windows: `%APPDATA%\Claude\logs\mcp*.log`
6. **Test the command manually**: copy the `command` and `args` from your config and run them in a terminal to see if the server starts.

Looking Ahead: Built-In Alternatives to MCP

DesktopCommander and Browser-Use add terminal and browser control to Claude Desktop's **Chat** mode. But Claude Desktop also has other modes—available on paid plans—that have these capabilities built in. We will cover them later in the course.

	Chat	Code tab	Cowork tab
Terminal / files	**MCP needed**	Built in	Built in
Browser control	**MCP needed**	Chrome ext	Chrome ext
Available on	All plans	Pro+	Pro+

- **Code tab**: a coding environment built into Claude Desktop with terminal and file access
- **Cowork tab**: an agent that works with your local files in a sandboxed environment
- **Claude in Chrome**: a browser extension—built-in alternative to Browser-Use

Summary

- **MCP** is a standard protocol that connects AI apps to external tools
- **MCP servers** are plug-ins—each one adds specific capabilities
- Install via **Desktop Extensions** (easy) or **config file** (flexible)
- **Browser-Use**: autonomous web browsing—forms, downloads, data extraction
- **DesktopCommanderMCP**: terminal access—commands, files, processes
- **Alpha Vantage** and **Financial Modeling Prep**: financial data with free tiers
- Combine servers for end-to-end workflows

MCP turns Claude from a conversation partner into a tool that takes action on your computer.