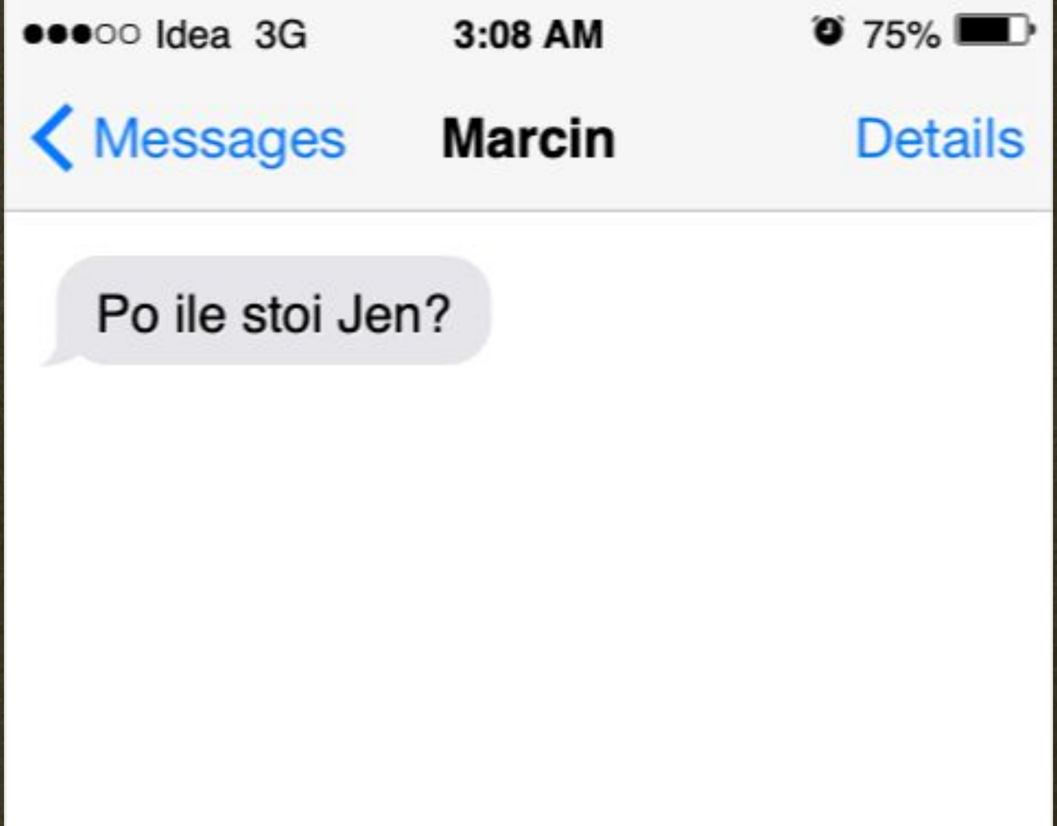
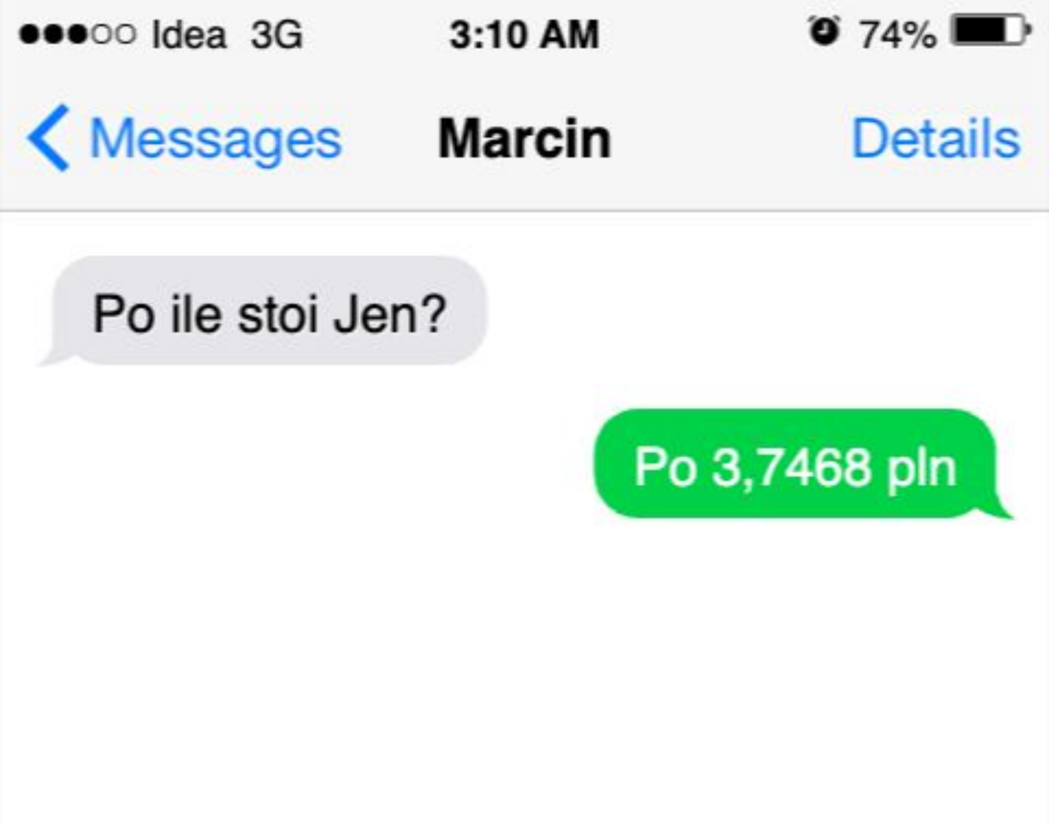
Adam Świderski, Poznań JUG 10.12.2025

1978 called, it wants its architecture back.

small tools, big brains - powering LLMs with MCP



Po ile stoi Jen?



Po ile stoi Jen?

Po 3,7468 pln

I was the LLM

```
Input: "Po ile stoi Jen?"
Tools: [pc] [currency exchange website] [response formatter]
Output: "Po 3,7468 pln"
```

I'm Adam

typescript

kotlin

mongodb

javascript

android

zig

go

postgresql

java

markdown

swift

sql

git

One task, one tool

```
# Human (2011)
Friend: "Po ile stoi Jen?"
Adam:
      → turnOnPc()
      → checkConversionRateOnline()
      → formatResponse()
```

One task, one tool

```
# Human (2011)
Friend: "Po ile stoi Jen?"
Adam:
    → turnOnPc()
    → checkConversionRateOnline()
    → formatResponse()
```

```
# MCP (2024)
User: "Convert 100 USD to EUR"
Claude orchestrates:
  → fetch_exchange_rate()
  → calculate_conversion()
  → format_response()
```

"Write programs that do one thing and do it well. Write programs to work together."

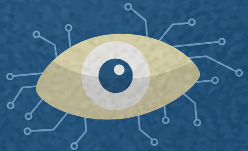
Doug McIlroy

One task, one tool

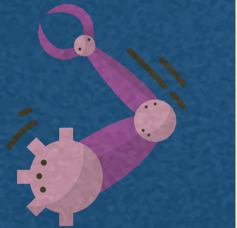
```
# Human (2011)
Friend: "Po ile stoi Jen?"
Adam:
    → turnOnPc()
    → checkConversionRateOnline()
    → formatResponse()
```

```
# MCP (2024)
User: "Convert 100 USD to EUR"
Claude orchestrates:
  → fetch_exchange_rate()
  → calculate_conversion()
  → format_response()
```

```
# Unix (1978)
cat application.log | grep ERROR | awk '{print $4}' | sort | uniq -c
```



Glossary



Glossary

LLM
Large Language Model

Glossary

LLM

Large Language Model

Token

Basic unit of text processing

Glossary

LLM	Token	Context
Large Language Model	Basic unit of text processing	Information available to llm within single interaction

Glossary

LLM

Large Language Model

Token

Basic unit of text processing

Context

Information available to llm within single interaction

Function Calling

Allows llm to call external tools

Glossary

LLM

Large Language Model

Token

Basic unit of text processing

Context

Information available to llm within single interaction

Function Calling

Allows llm to call external tools

Agent

Single purposed scoped llm interaction

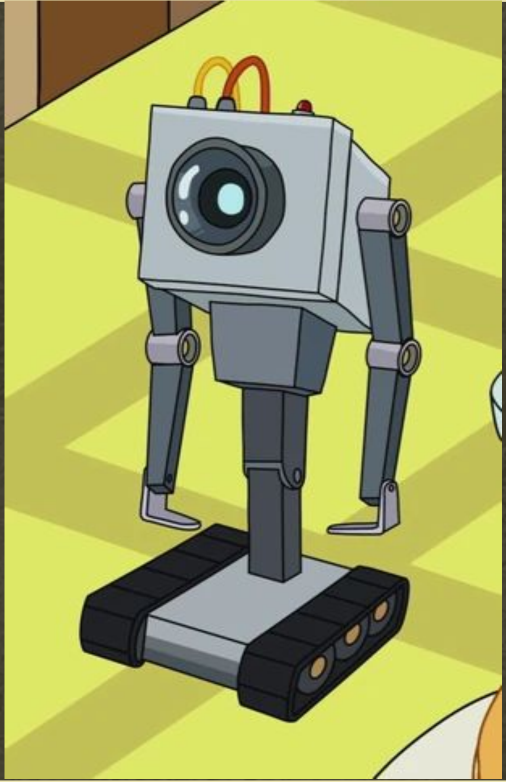
Glossary

LLM

Large Language Model

Function Calling

Allows llm to call external tools



Context

Information available to llm within single interaction

Glossary

LLM

Large Language Model

Token

Basic unit of text processing

Context

Information available to llm within single interaction

Function Calling

Allows llm to call external tools

Agent

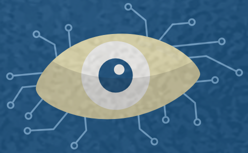
Single purposed scoped llm interaction

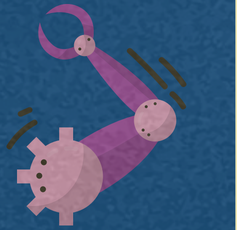
MCP

Model Context Protocol

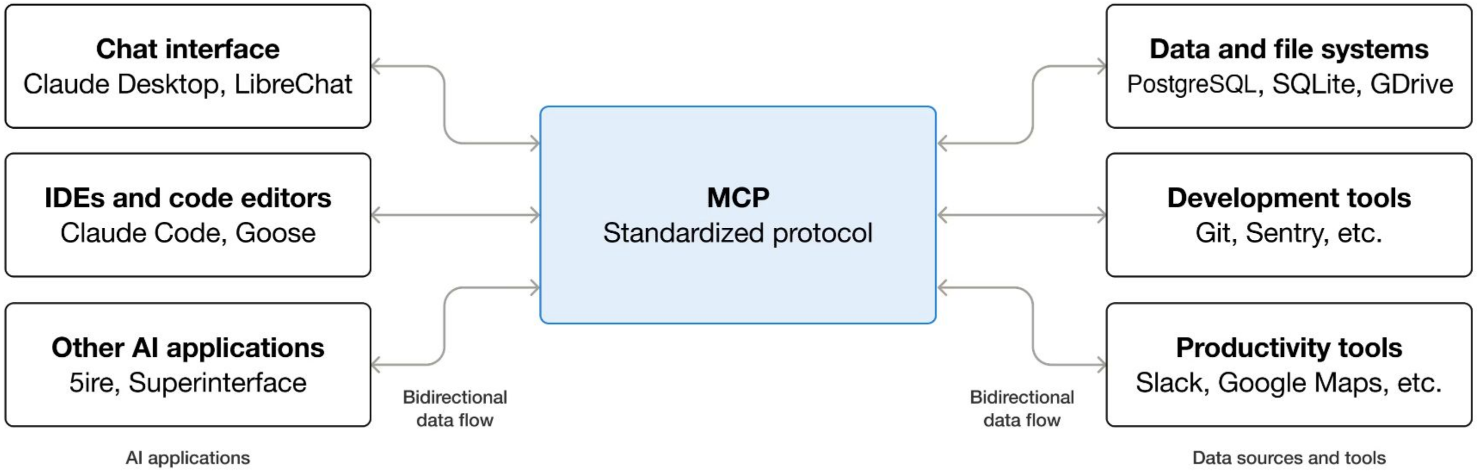
MCP

Model Context Protocol





MCP



Chat interface
Claude Desktop, LibreChat

IDEs and code editors
Claude Code, Goose

Other AI applications
5ire, Superinterface

AI applications

Bidirectional
data flow

MCP
Standardized protocol

Bidirectional
data flow

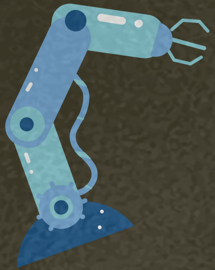
Data and file systems
PostgreSQL, SQLite, GDrive

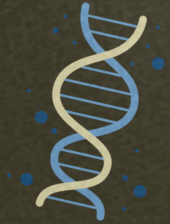
Development tools
Git, Sentry, etc.

Productivity tools
Slack, Google Maps, etc.

Data sources and tools

MCP

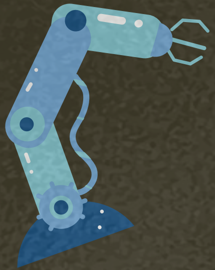


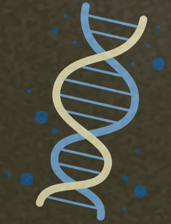


Tools

Functions

MCP





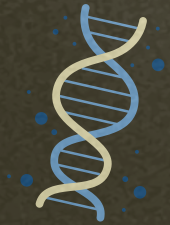
Tools

Functions

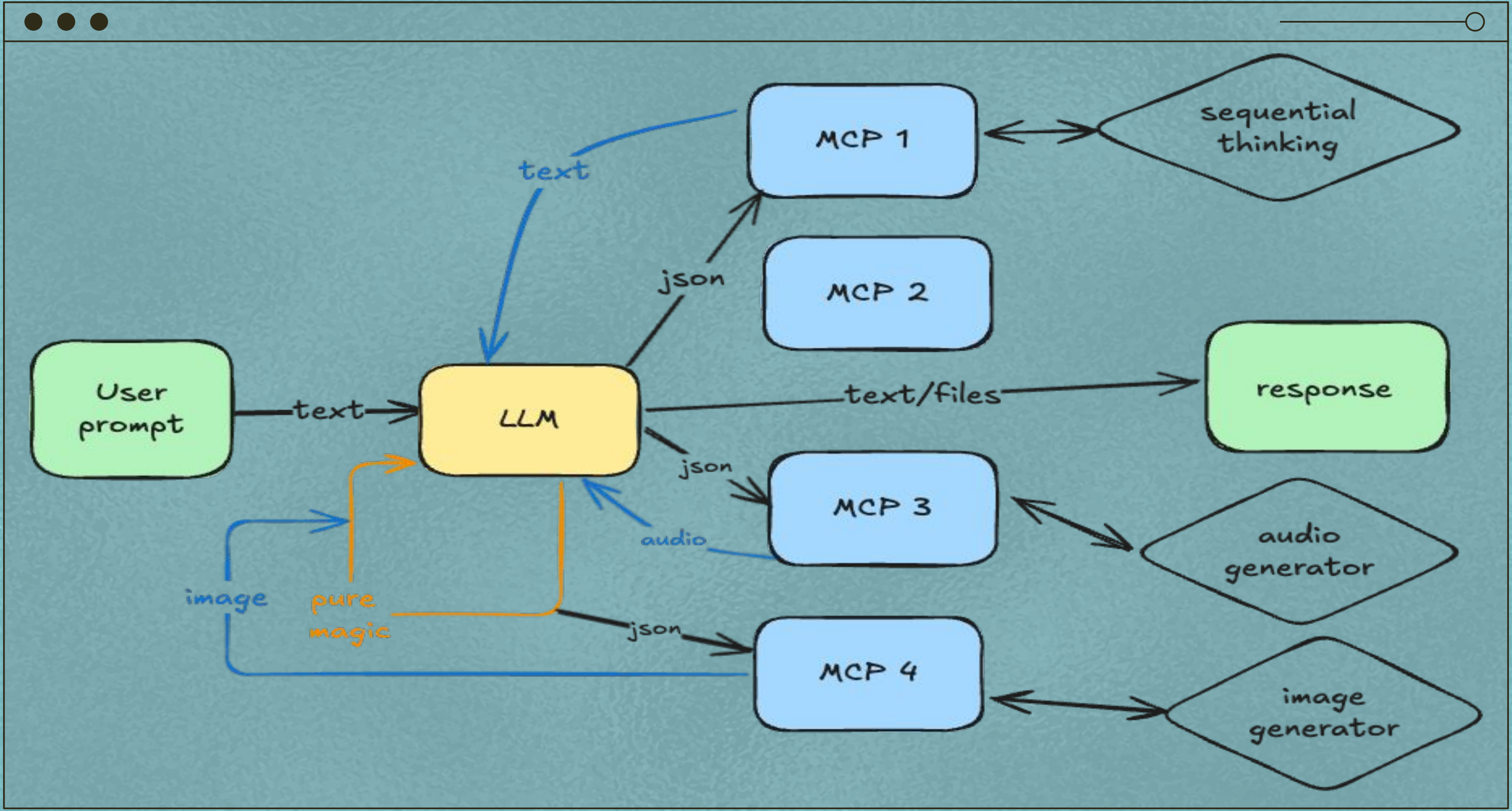
Resources

Files, data from db etc.

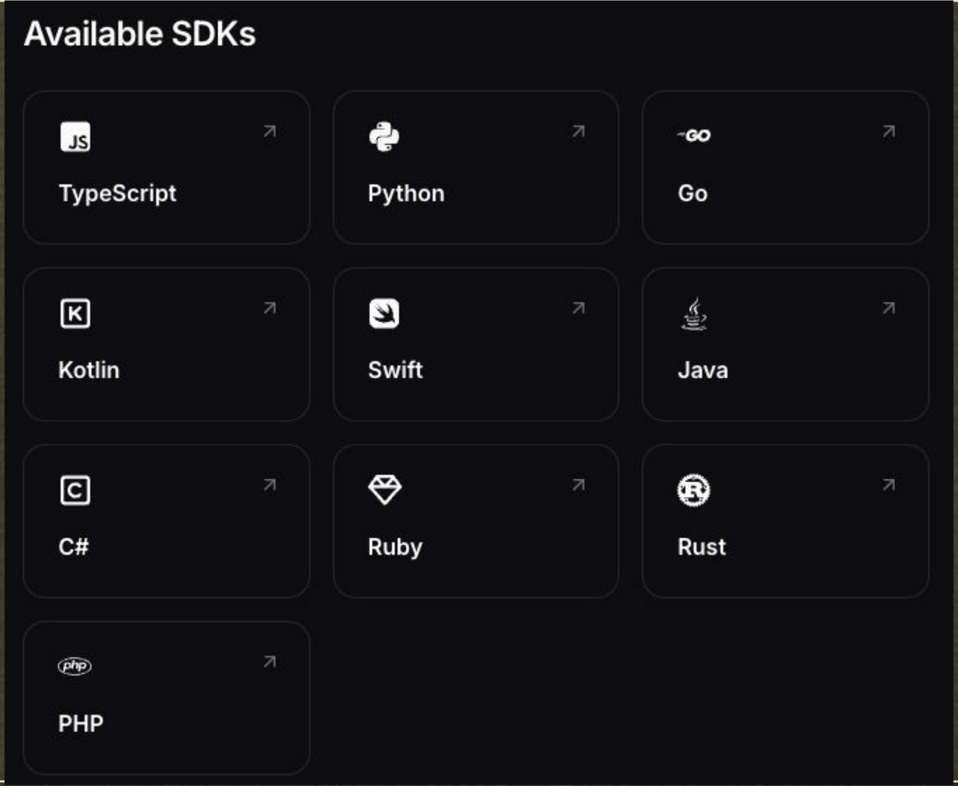
MCP



Tools	Resources	Prompts
Functions	Files, data from db etc.	Templates


User prompt
text
LLM
text
json
MCP 1
sequential thinking
MCP 2
text/files
response
json
MCP 3
audio
audio generator
image
pure magic
json
MCP 4
image generator

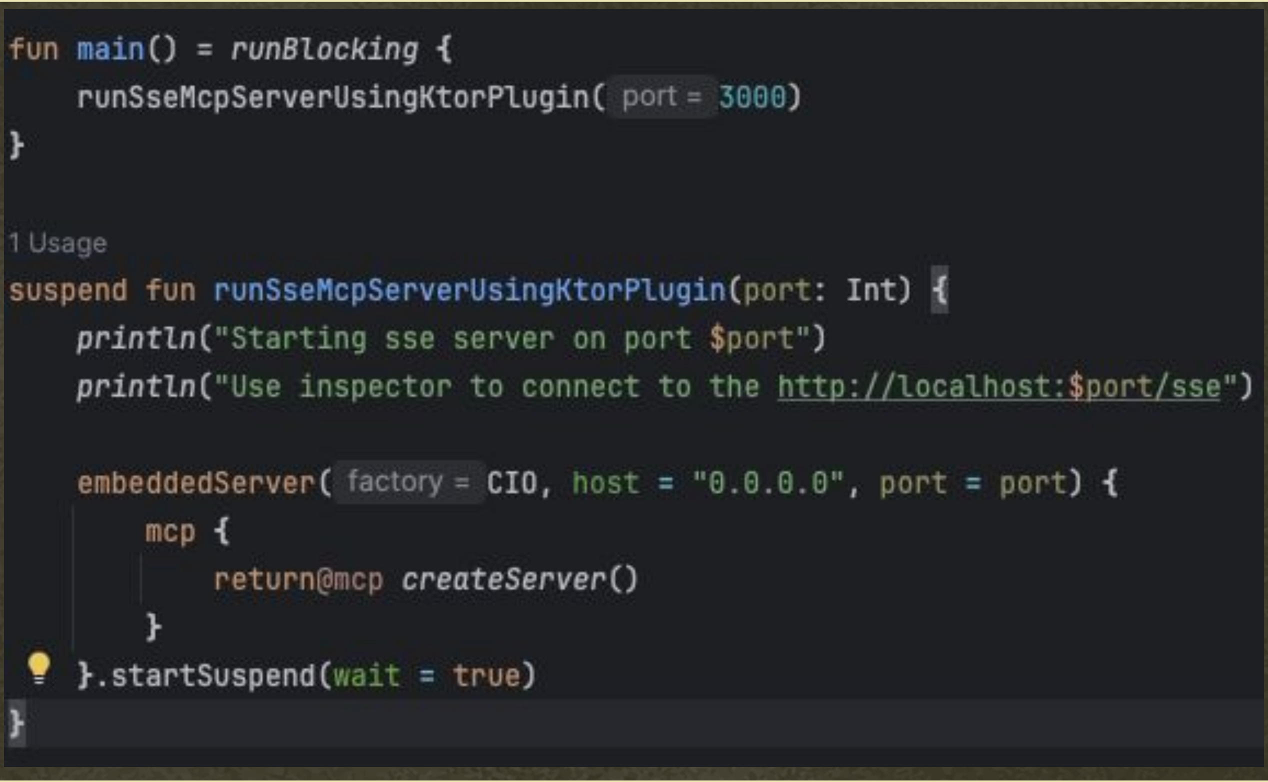
Let's build the thing



Available SDKs

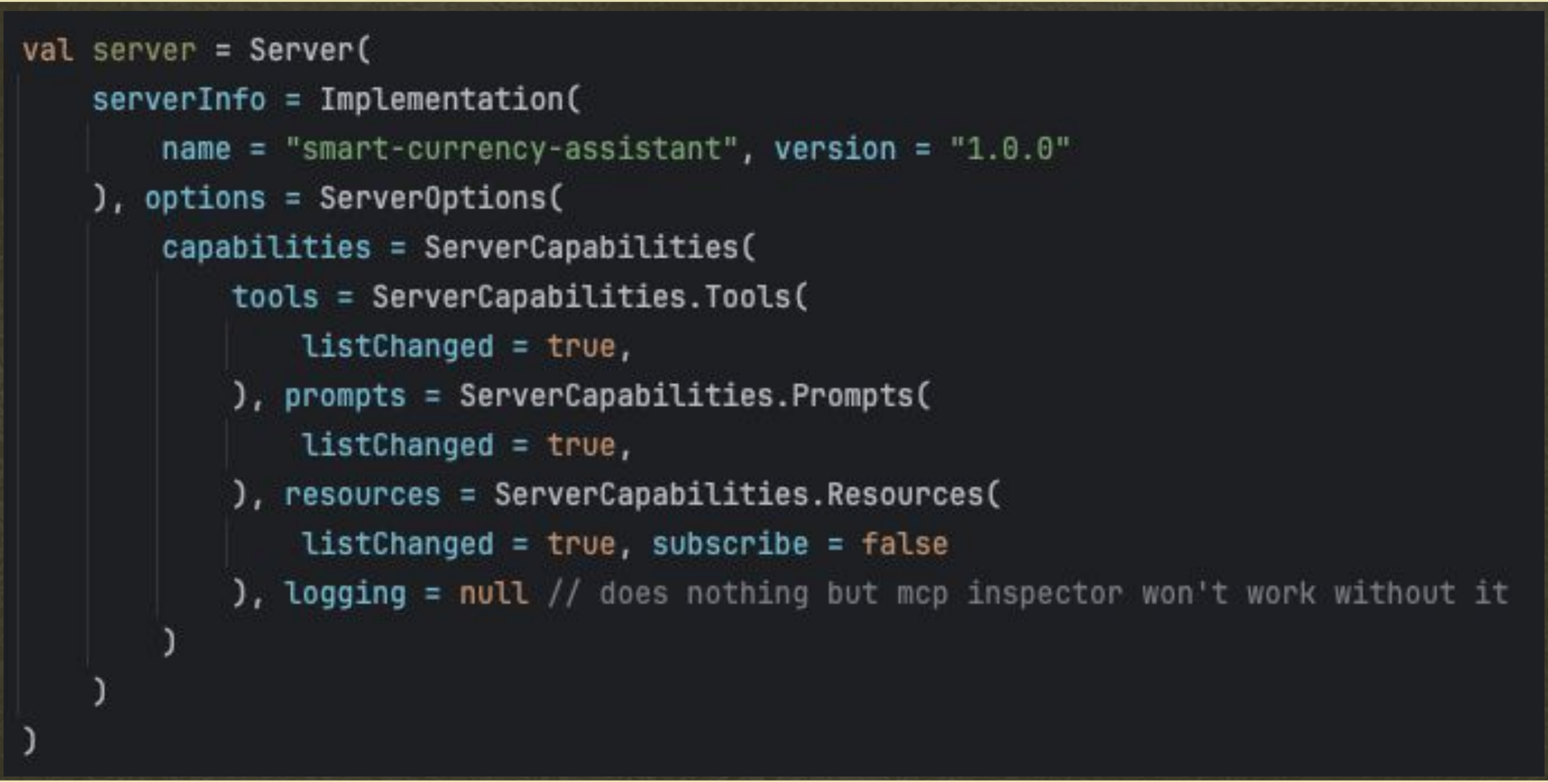
- TypeScript
- Python
- Go
- Kotlin
- Swift
- Java
- C#
- Ruby
- Rust
- PHP

Let's build the thing



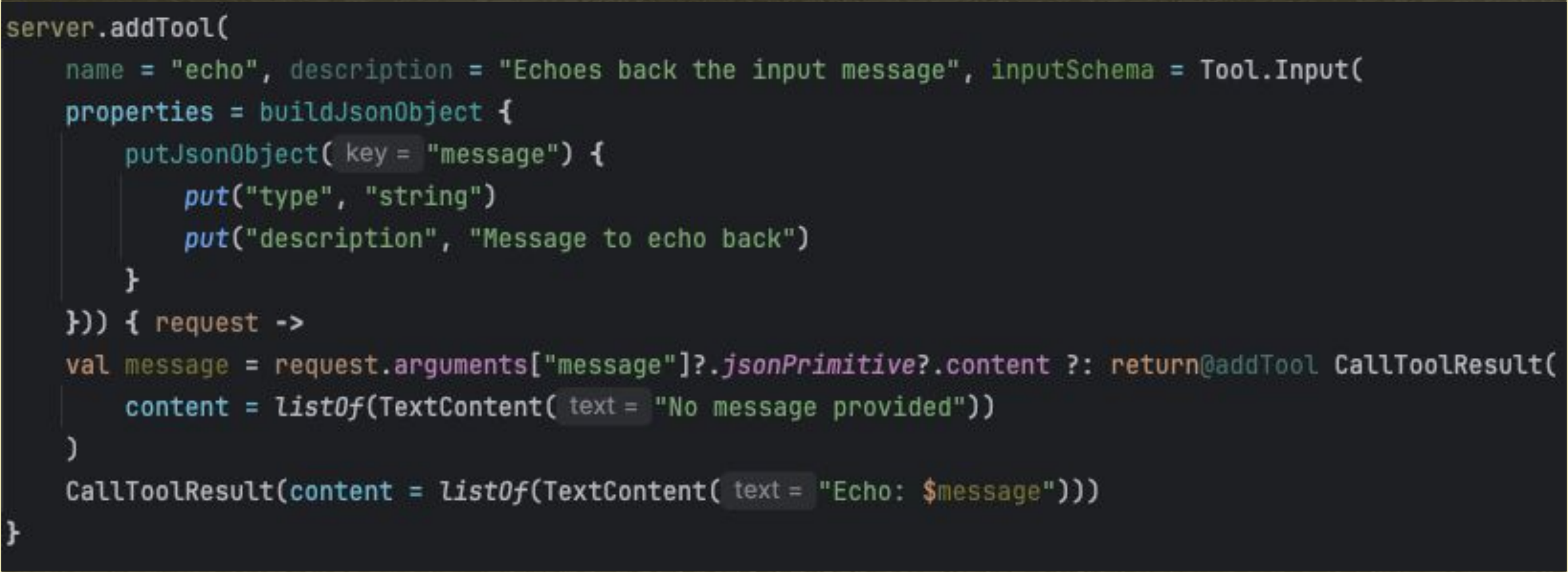
```kotlin
fun main() = runBlocking {
    runSseMcpServerUsingKtorPlugin( port = 3000)
}

1 Usage
suspend fun runSseMcpServerUsingKtorPlugin(port: Int) {
    println("Starting sse server on port $port")
    println("Use inspector to connect to the http://localhost:$port/sse")

    embeddedServer( factory = CIO, host = "0.0.0.0", port = port) {
        mcp {
            return@mcp createServer()
        }
    }.startSuspend(wait = true)
}
```

Server



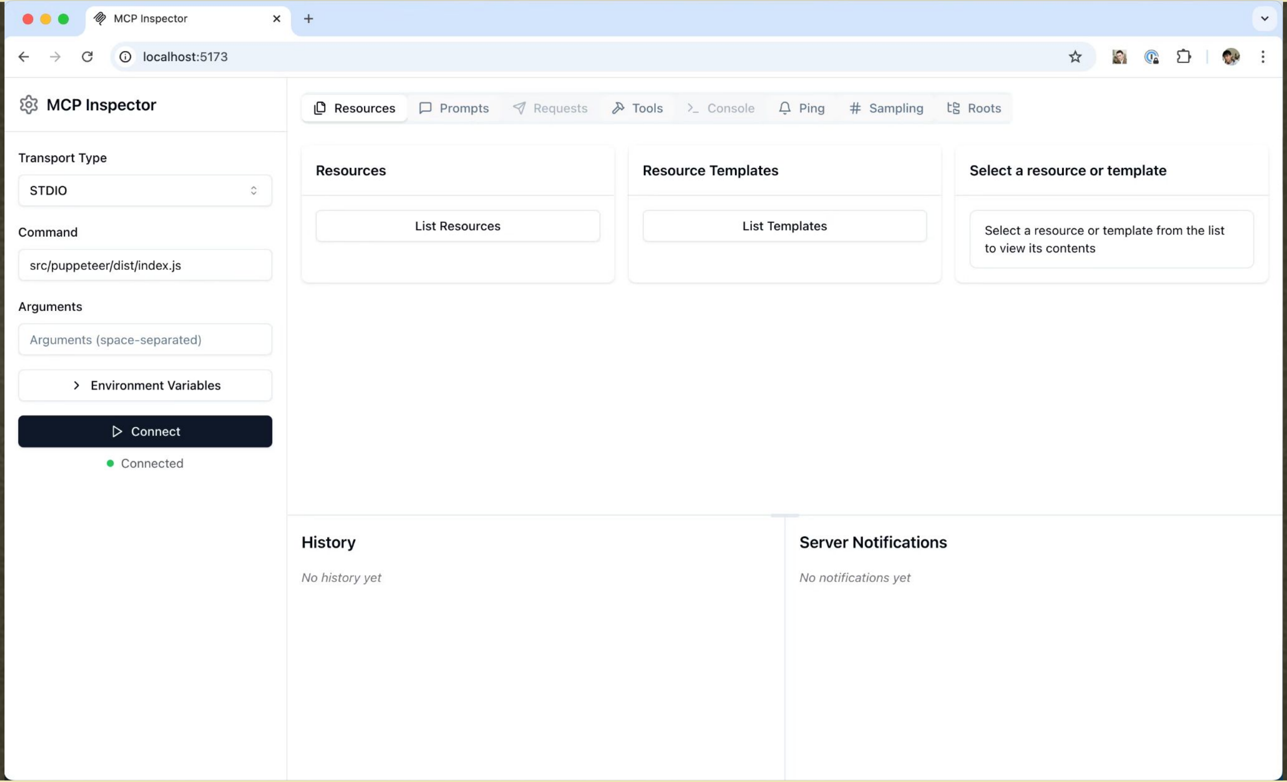
```
val server = Server(
    serverInfo = Implementation(
        name = "smart-currency-assistant", version = "1.0.0"
    ), options = ServerOptions(
        capabilities = ServerCapabilities(
            tools = ServerCapabilities.Tools(
                listChanged = true,
            ), prompts = ServerCapabilities.Prompts(
                listChanged = true,
            ), resources = ServerCapabilities.Resources(
                listChanged = true, subscribe = false
            ), logging = null // does nothing but mcp inspector won't work without it
        )
    )
)
```

Tool



```
server.addTool(
    name = "echo", description = "Echoes back the input message", inputSchema = Tool.Input(
    properties = buildJsonObject {
        putJsonObject( key = "message") {
            put("type", "string")
            put("description", "Message to echo back")
        }
    })) { request ->
    val message = request.arguments["message"]?.jsonPrimitive?.content ?: return@addTool CallToolResult(
        content = listOf(TextContent( text = "No message provided"))
    )
    CallToolResult(content = listOf(TextContent( text = "Echo: $message")))
}
```

Inspector



MCP Inspector

localhost:5173

Transport Type: STDIO

Command: src/puppeteer/dist/index.js

Arguments: Arguments (space-separated)

● Connected

Select a resource or template from the list to view its contents

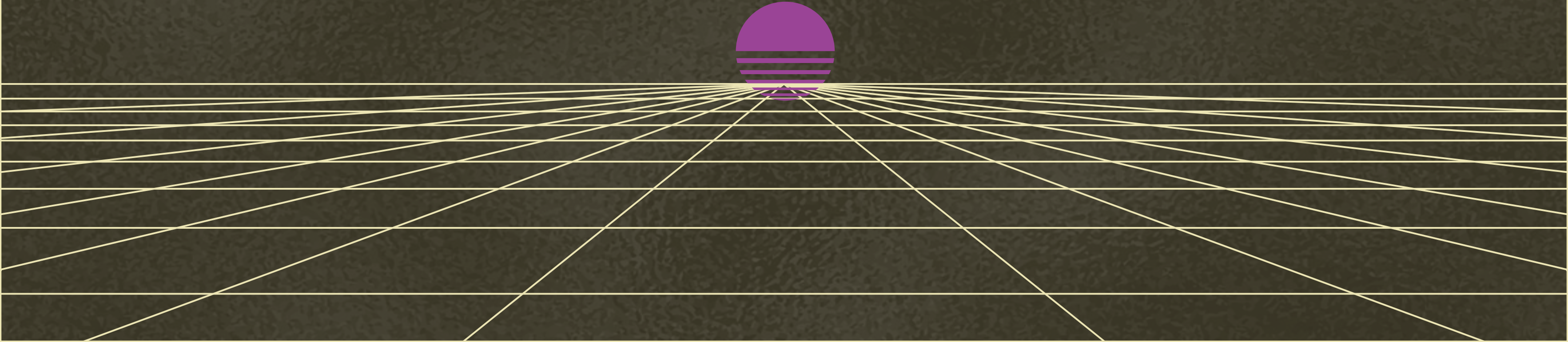
History

No history yet

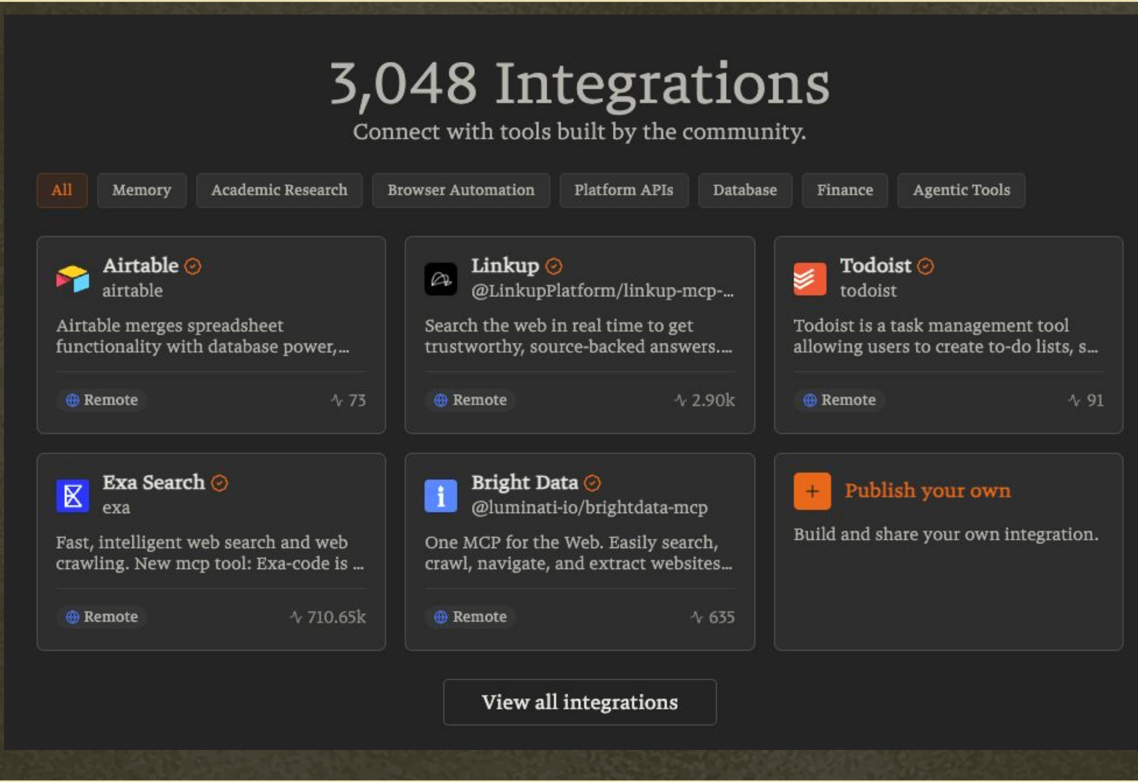
Server Notifications

No notifications yet

Demo



I need more MCPs



3,048 Integrations

Connect with tools built by the community.

Airtable
airtable
Airtable merges spreadsheet functionality with database power,...
Remote · 73

Linkup
@LinkupPlatform/linkup-mcp-...
Search the web in real time to get trustworthy, source-backed answers....
Remote · 2.90k

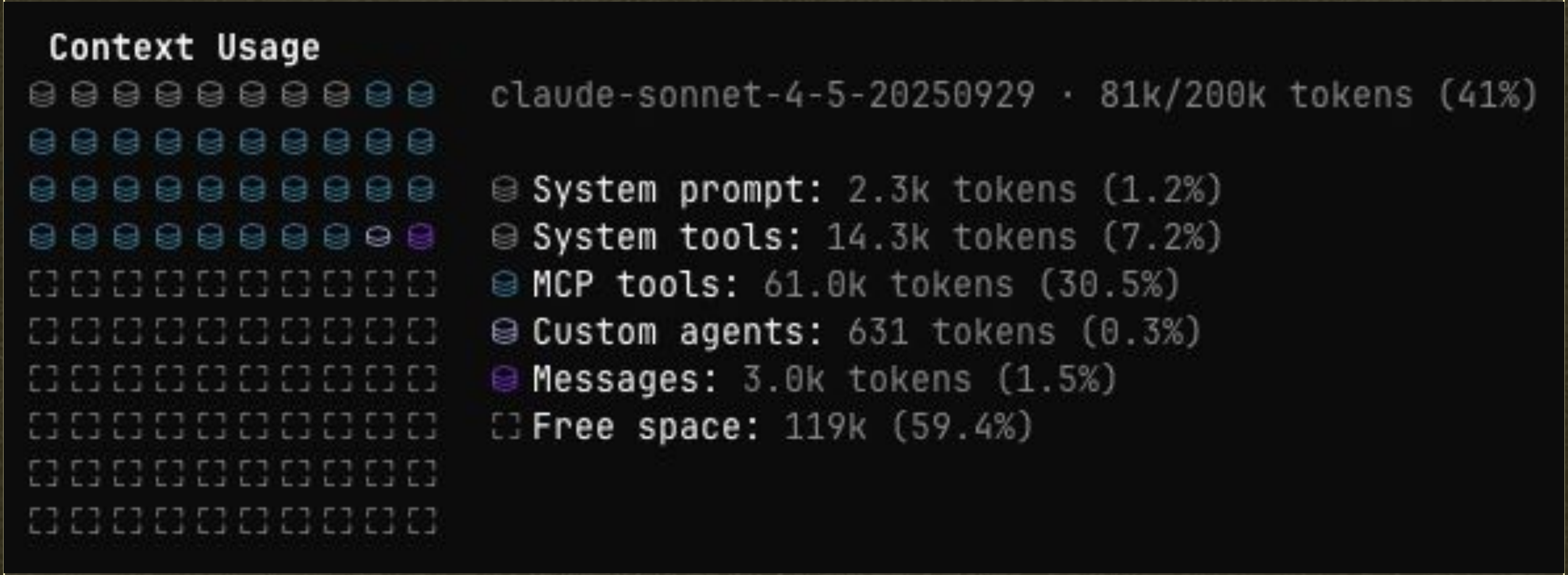
Todoist
todoist
Todoist is a task management tool allowing users to create to-do lists, s...
Remote · 91

Exa Search
exa
Fast, intelligent web search and web crawling. New mcp tool: Exa-code is ...
Remote · 710.65k

Bright Data
@luminati-io/brightdata-mcp
One MCP for the Web. Easily search, crawl, navigate, and extract websites...
Remote · 635

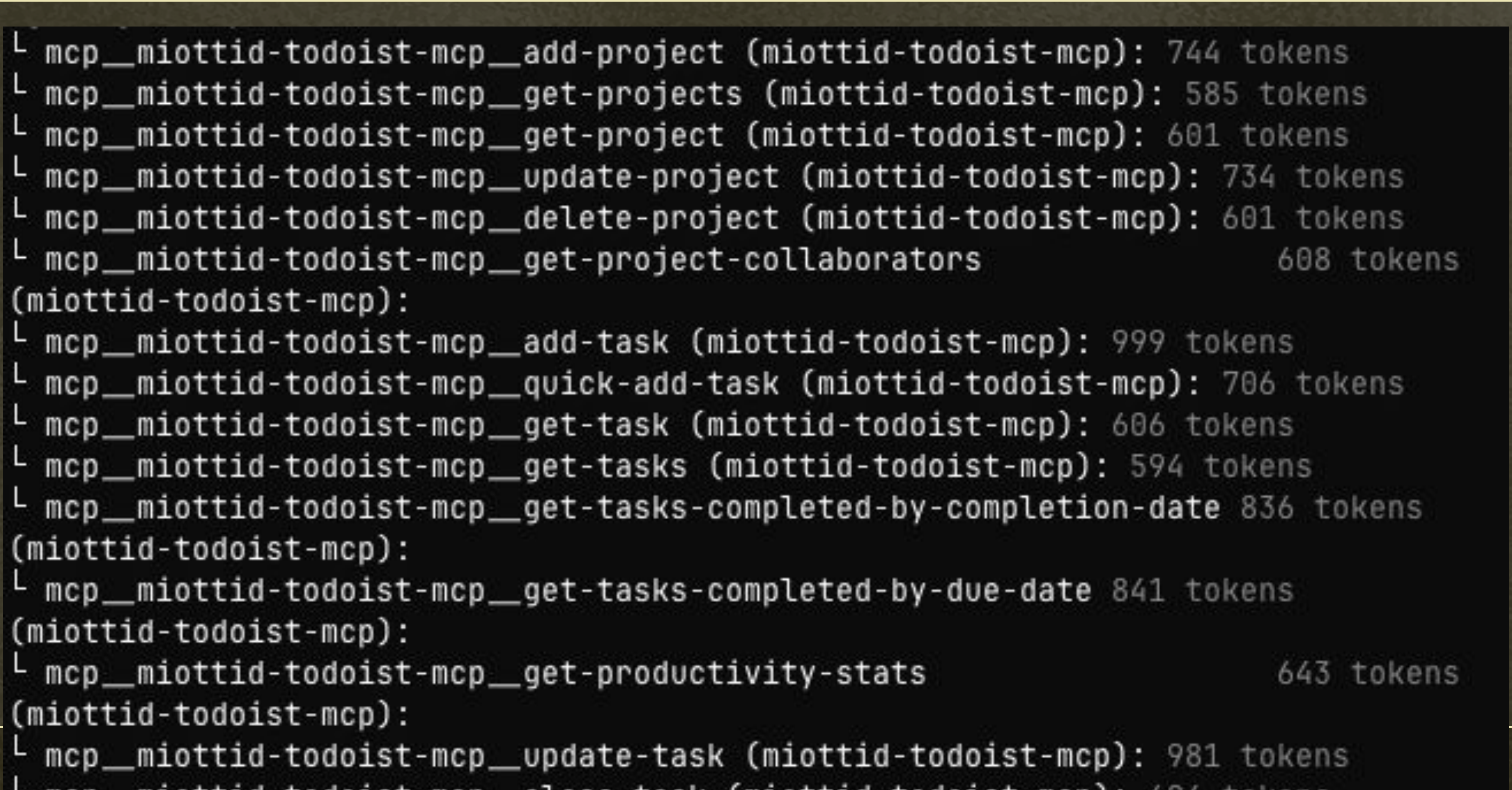
Publish your own
Build and share your own integration.

How not to build mcps



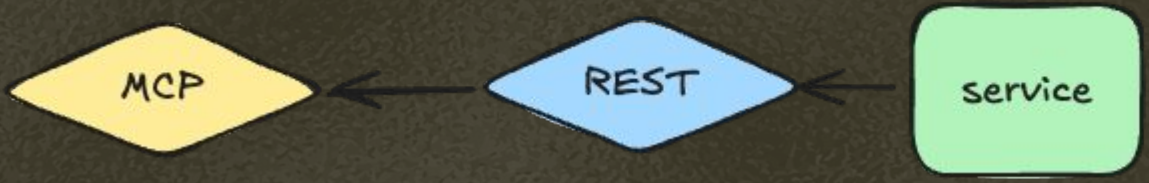
```
 Context Usage
⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁   claude-sonnet-4-5-20250929 · 81k/200k tokens (41%)
⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁
⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁   ⛁ System prompt: 2.3k tokens (1.2%)
⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛁ ⛀ ⛁   ⛁ System tools: 14.3k tokens (7.2%)
⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶   ⛁ MCP tools: 61.0k tokens (30.5%)
⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶   ⛁ Custom agents: 631 tokens (0.3%)
⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶   ⛁ Messages: 3.0k tokens (1.5%)
⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶   ⛶ Free space: 119k (59.4%)
⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶
⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶ ⛶
```

How not to build mcps

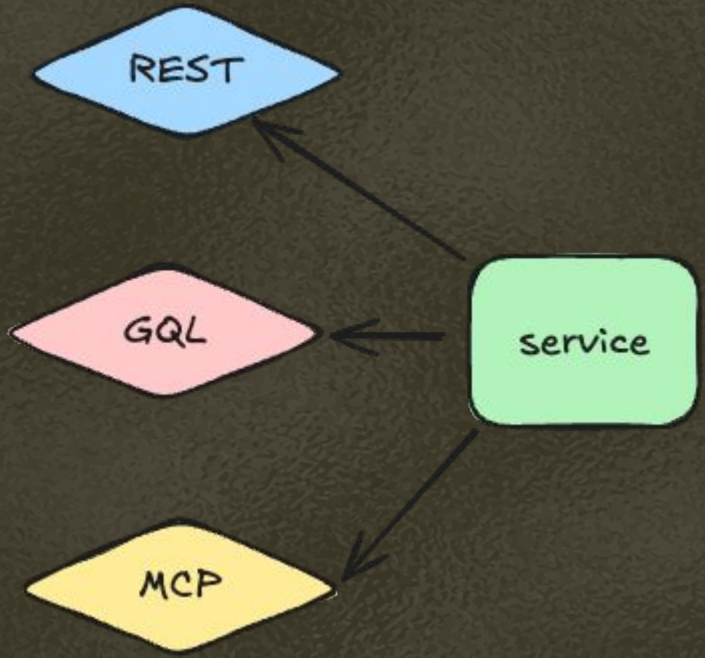


```
└ mcp__miottid-todoist-mcp__add-project (miottid-todoist-mcp): 744 tokens
└ mcp__miottid-todoist-mcp__get-projects (miottid-todoist-mcp): 585 tokens
└ mcp__miottid-todoist-mcp__get-project (miottid-todoist-mcp): 601 tokens
└ mcp__miottid-todoist-mcp__update-project (miottid-todoist-mcp): 734 tokens
└ mcp__miottid-todoist-mcp__delete-project (miottid-todoist-mcp): 601 tokens
└ mcp__miottid-todoist-mcp__get-project-collaborators                608 tokens
(miottid-todoist-mcp):
└ mcp__miottid-todoist-mcp__add-task (miottid-todoist-mcp): 999 tokens
└ mcp__miottid-todoist-mcp__quick-add-task (miottid-todoist-mcp): 706 tokens
└ mcp__miottid-todoist-mcp__get-task (miottid-todoist-mcp): 606 tokens
└ mcp__miottid-todoist-mcp__get-tasks (miottid-todoist-mcp): 594 tokens
└ mcp__miottid-todoist-mcp__get-tasks-completed-by-completion-date 836 tokens
(miottid-todoist-mcp):
└ mcp__miottid-todoist-mcp__get-tasks-completed-by-due-date 841 tokens
(miottid-todoist-mcp):
└ mcp__miottid-todoist-mcp__get-productivity-stats                   643 tokens
(miottid-todoist-mcp):
└ mcp__miottid-todoist-mcp__update-task (miottid-todoist-mcp): 981 tokens
```

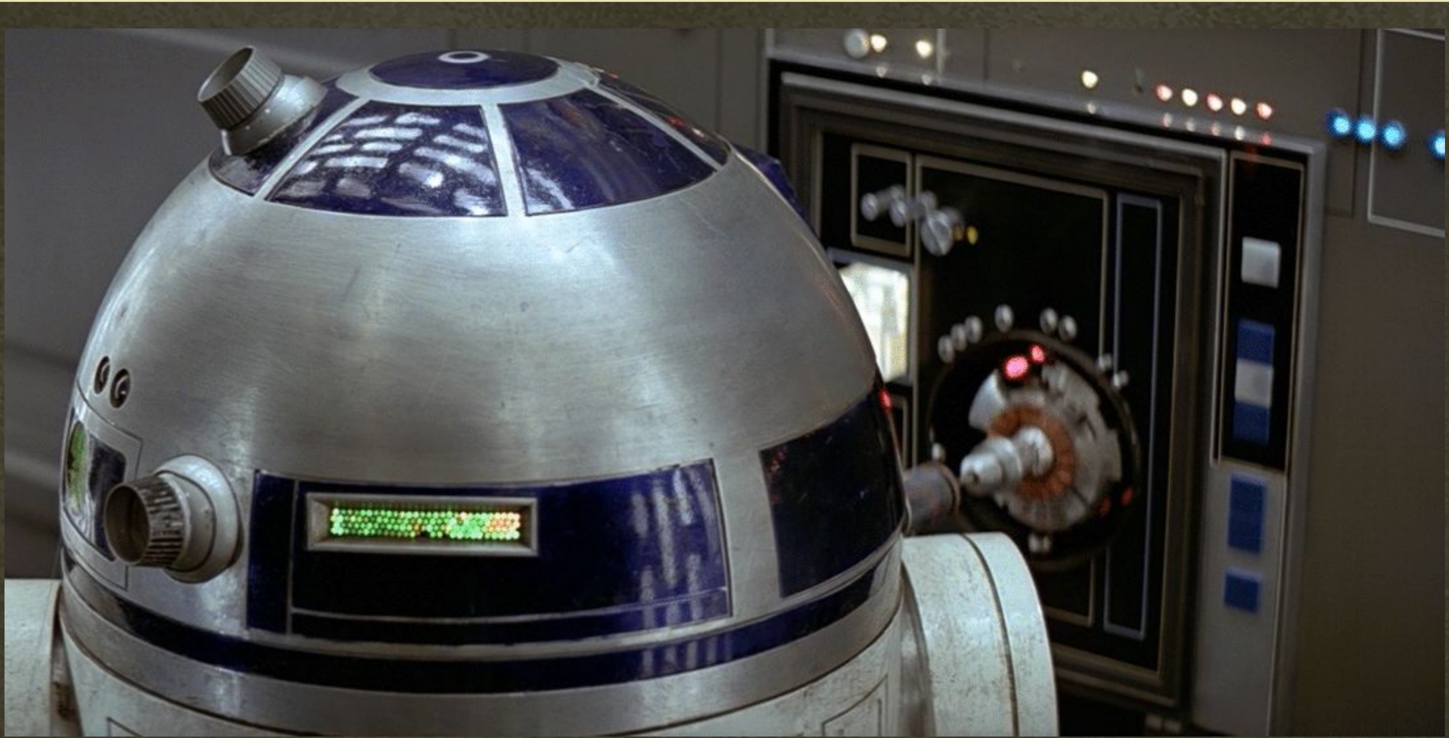
How not to build MCPs



How to build MCPs



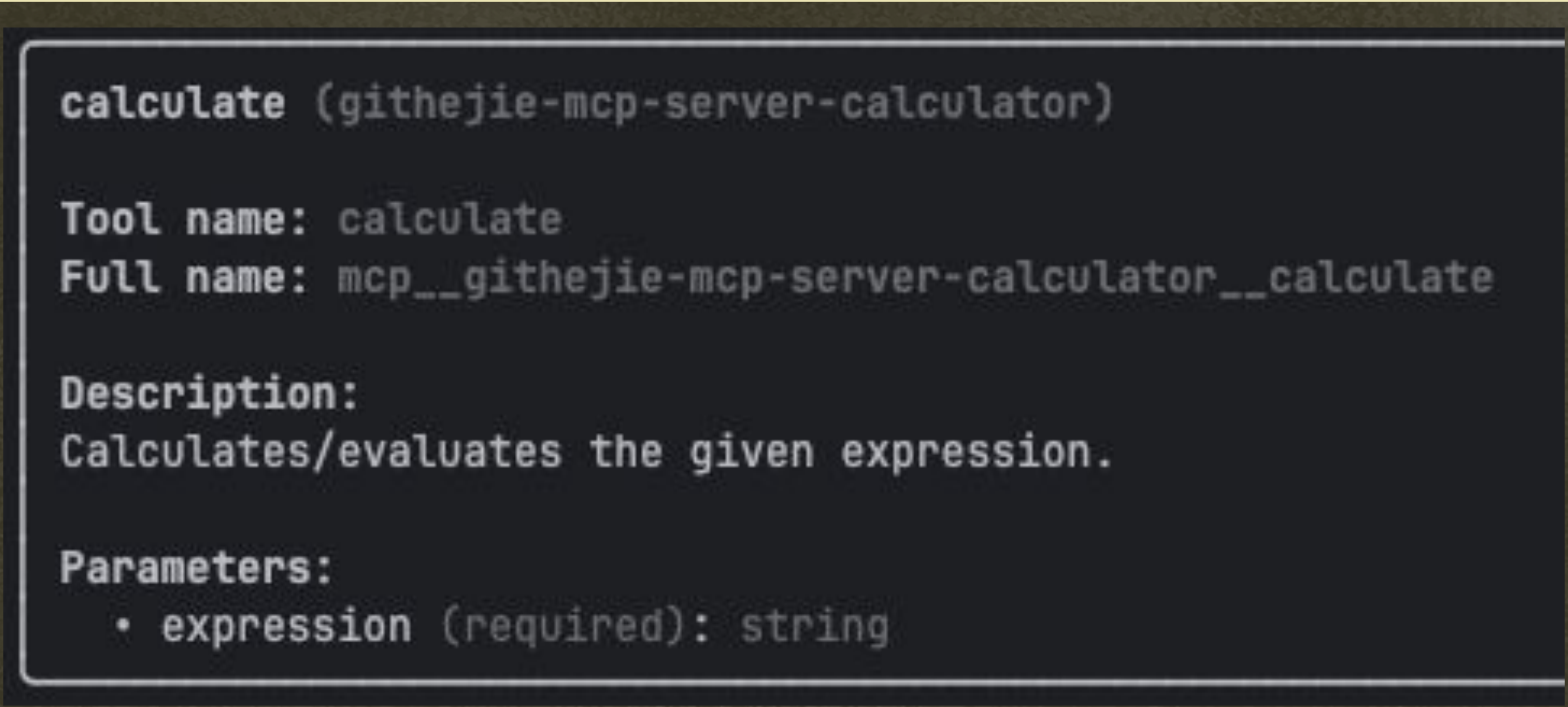
How to build mcps



LLM is a f######g tool, save the context at all times.

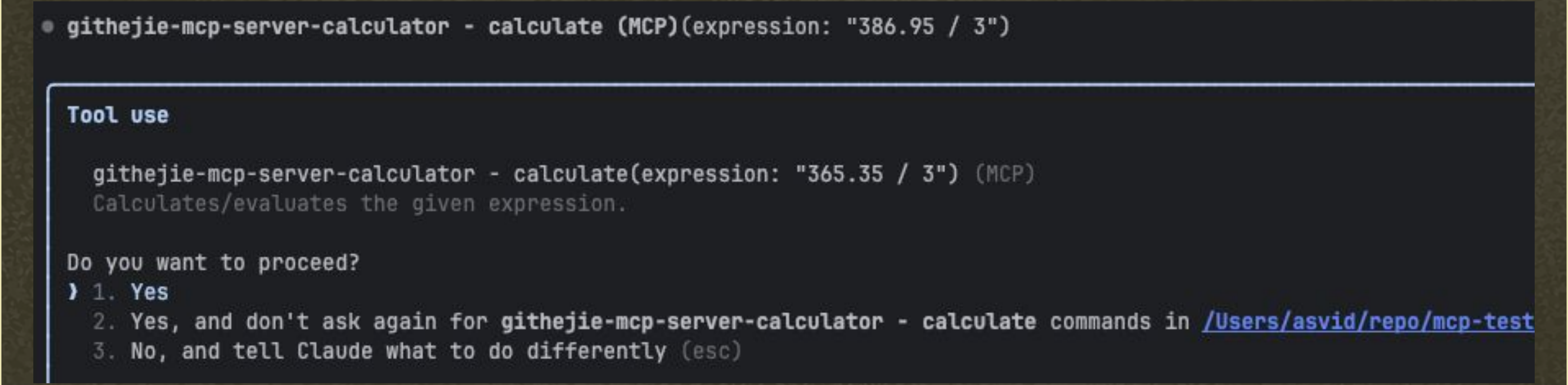
Some random dude

How to build mcps



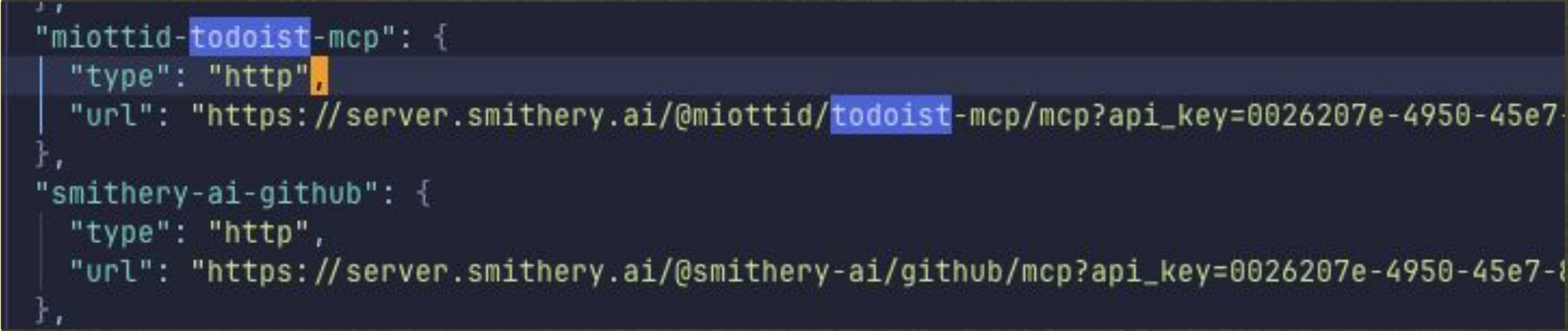
```
calculate (githejie-mcp-server-calculator)

Tool name: calculate
Full name: mcp__githejie-mcp-server-calculator__calculate

Description:
Calculates/evaluates the given expression.

Parameters:
  • expression (required): string
```

S in MCP stands for security



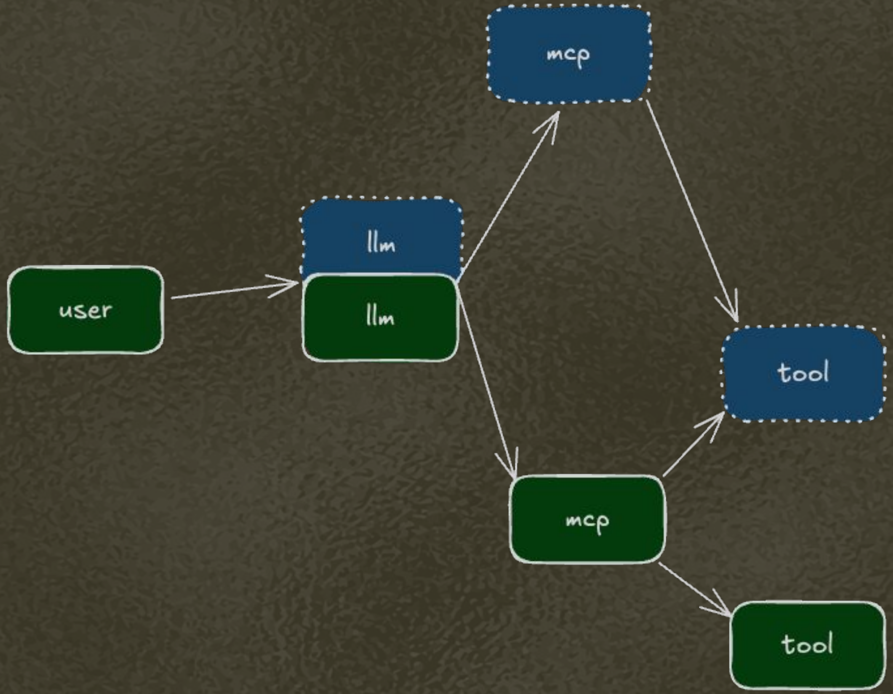
```
● githejie-mcp-server-calculator - calculate (MCP)(expression: "386.95 / 3")

 Tool use

   githejie-mcp-server-calculator - calculate(expression: "365.35 / 3") (MCP)
   Calculates/evaluates the given expression.

 Do you want to proceed?
 ❯ 1. Yes
   2. Yes, and don't ask again for githejie-mcp-server-calculator - calculate commands in /Users/asvid/repo/mcp-test
   3. No, and tell Claude what to do differently (esc)
```

S in MCP stands for security

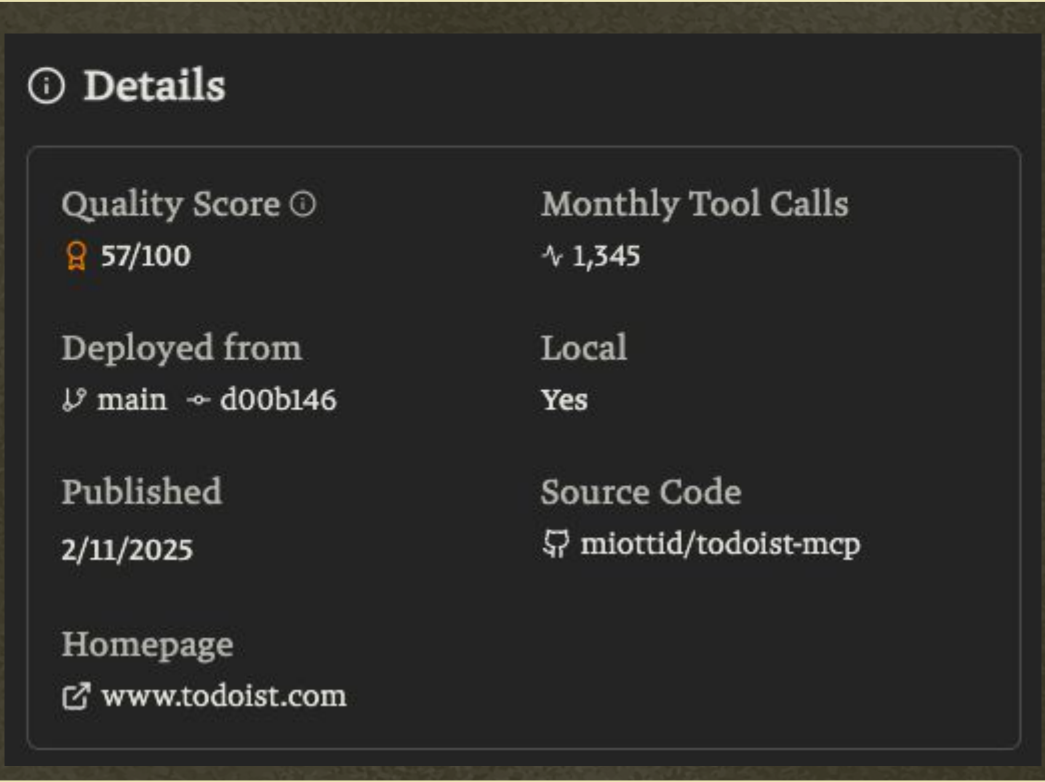


```
  },
  "miottid-todoist-mcp": {
    "type": "http",
    "url": "https://server.smithery.ai/@miottid/todoist-mcp/mcp?api_key=0026207e-4950-45e7-
  },
  "smithery-ai-github": {
    "type": "http",
    "url": "https://server.smithery.ai/@smithery-ai/github/mcp?api_key=0026207e-4950-45e7-
  },
```

S in MCP stands for security



S in MCP stands for security



Details

Quality Score
57/100

Monthly Tool Calls
1,345

Deployed from
main d00b146

Local
Yes

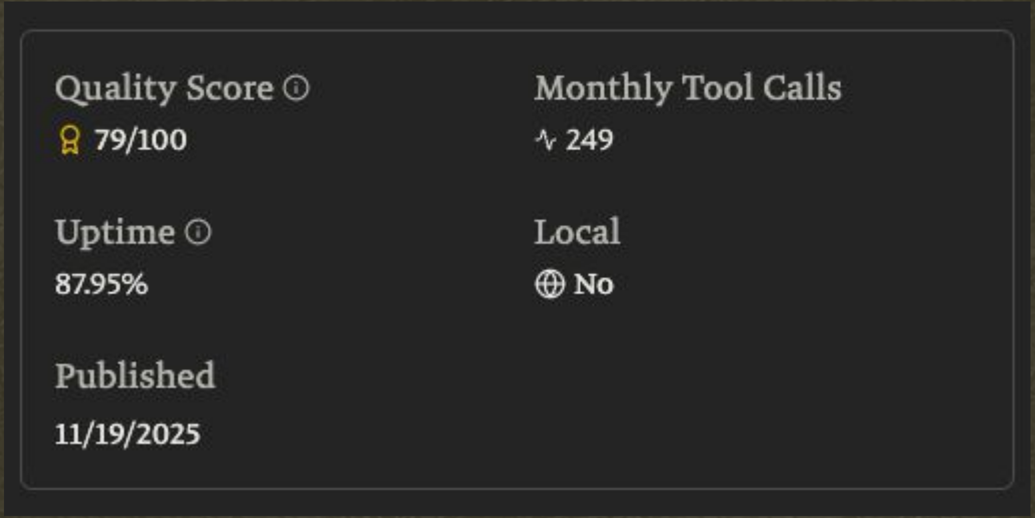
Published
2/11/2025

Source Code
miottid/todoist-mcp

Homepage
www.todoist.com

https://smithery.ai

R in MCP stands for reliability



Quality Score ⓘ

79/100

Monthly Tool Calls

249

Uptime ⓘ

87.95%

Local

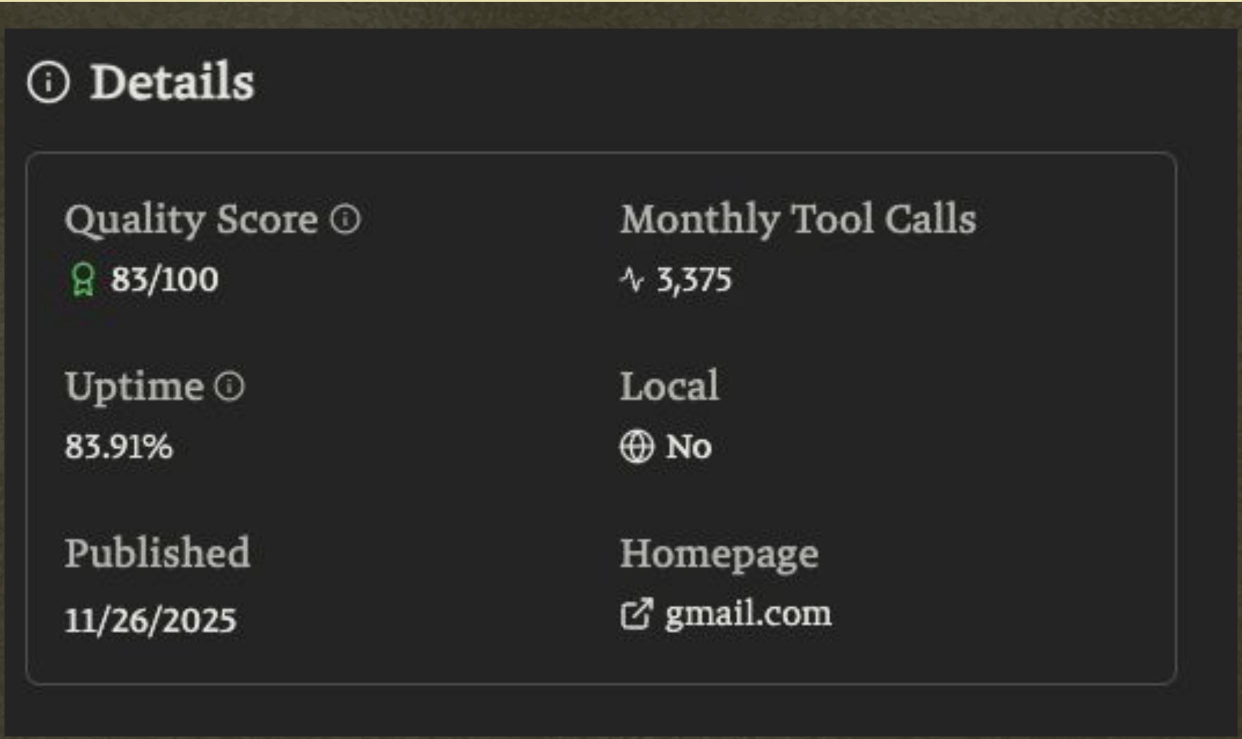
No

Published

11/19/2025

https://smithery.ai

R in MCP stands for reliability

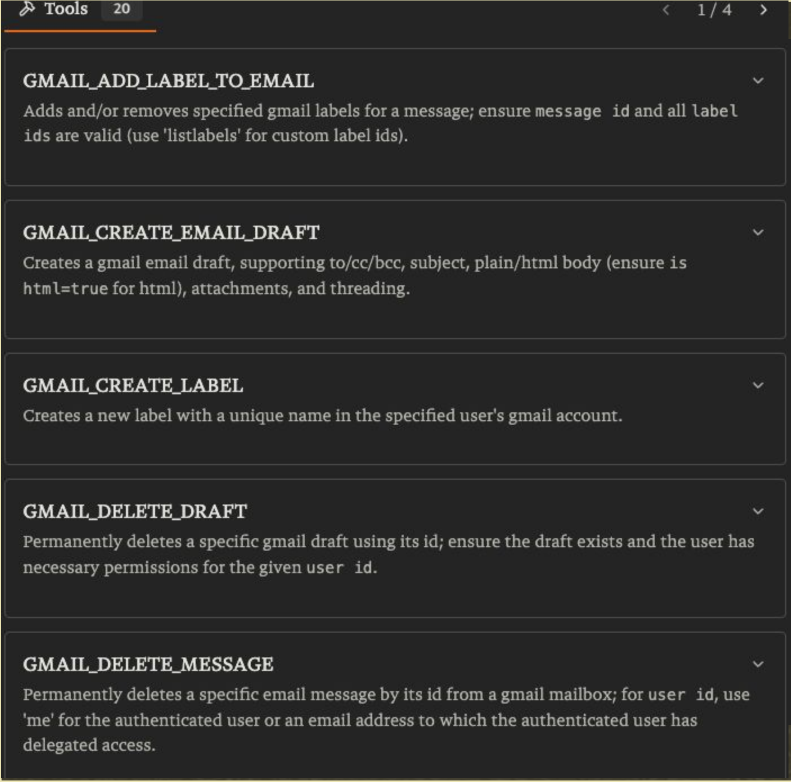


Details

Quality Score	Monthly Tool Calls
83/100	3,375
Uptime	Local
83.91%	No
Published	Homepage
11/26/2025	gmail.com

https://smithery.ai

S in MCP stands for standards



Tools 20

1 / 4

GMAIL_ADD_LABEL_TO_EMAIL

Adds and/or removes specified gmail labels for a message; ensure `message id` and all `label` ids are valid (use 'listlabels' for custom label ids).

GMAIL_CREATE_EMAIL_DRAFT

Creates a gmail email draft, supporting to/cc/bcc, subject, plain/html body (ensure `is html=true` for html), attachments, and threading.

GMAIL_CREATE_LABEL

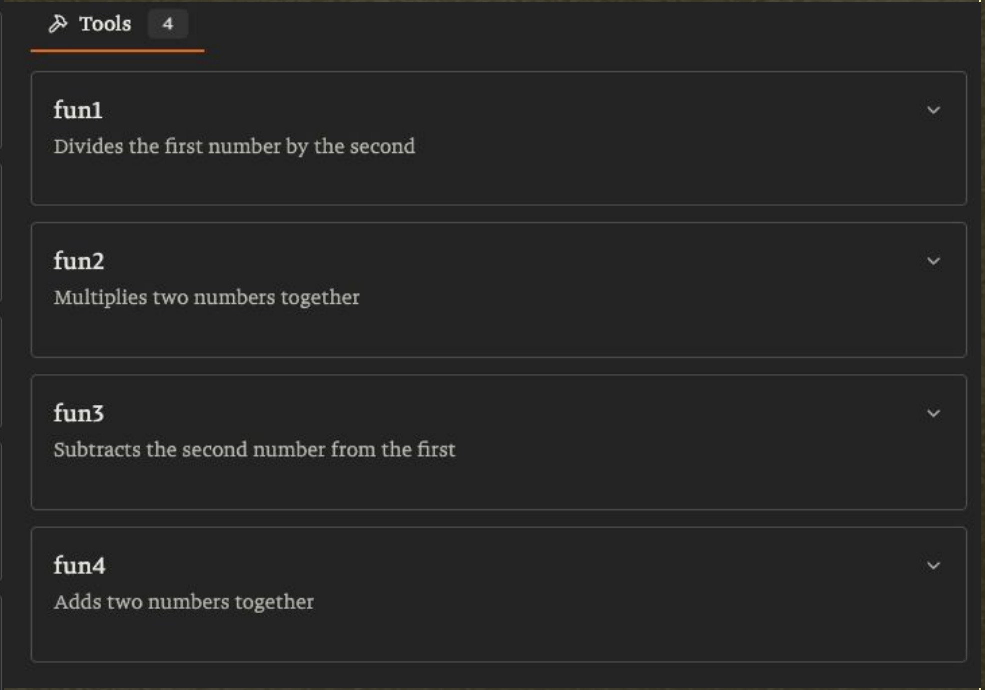
Creates a new label with a unique name in the specified user's gmail account.

GMAIL_DELETE_DRAFT

Permanently deletes a specific gmail draft using its id; ensure the draft exists and the user has necessary permissions for the given `user id`.

GMAIL_DELETE_MESSAGE

Permanently deletes a specific email message by its id from a gmail mailbox; for `user id`, use 'me' for the authenticated user or an email address to which the authenticated user has delegated access.



Tools 4

fun1

Divides the first number by the second

fun2

Multiplies two numbers together

fun3

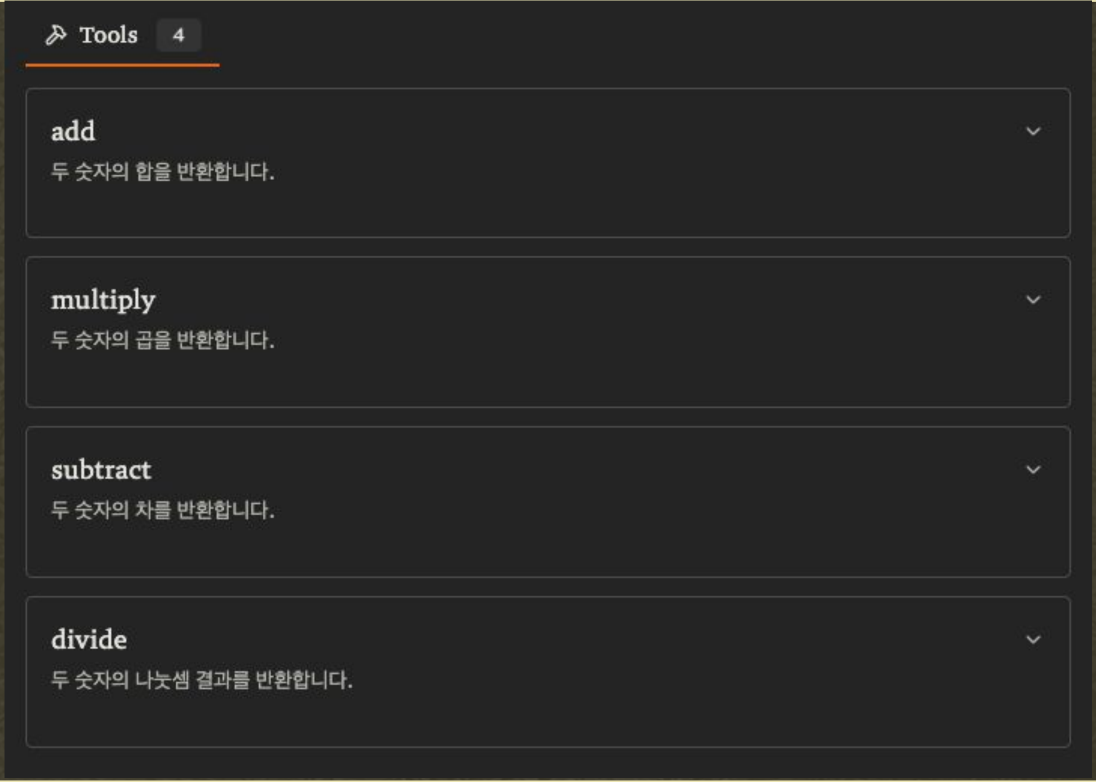
Subtracts the second number from the first

fun4

Adds two numbers together

https://smithery.ai

S in MCP stands for standards



add

두 숫자의 합을 반환합니다.

multiply

두 숫자의 곱을 반환합니다.

subtract

두 숫자의 차를 반환합니다.

divide

두 숫자의 나눗셈 결과를 반환합니다.

https://smithery.ai

Alternatives

Alternatives

Scripts

If you can run script, so can LLM

Alternatives

Scripts

If you can run script, so can LLM

CLI

Scripts but wrapped in a single tool

Alternatives

Scripts

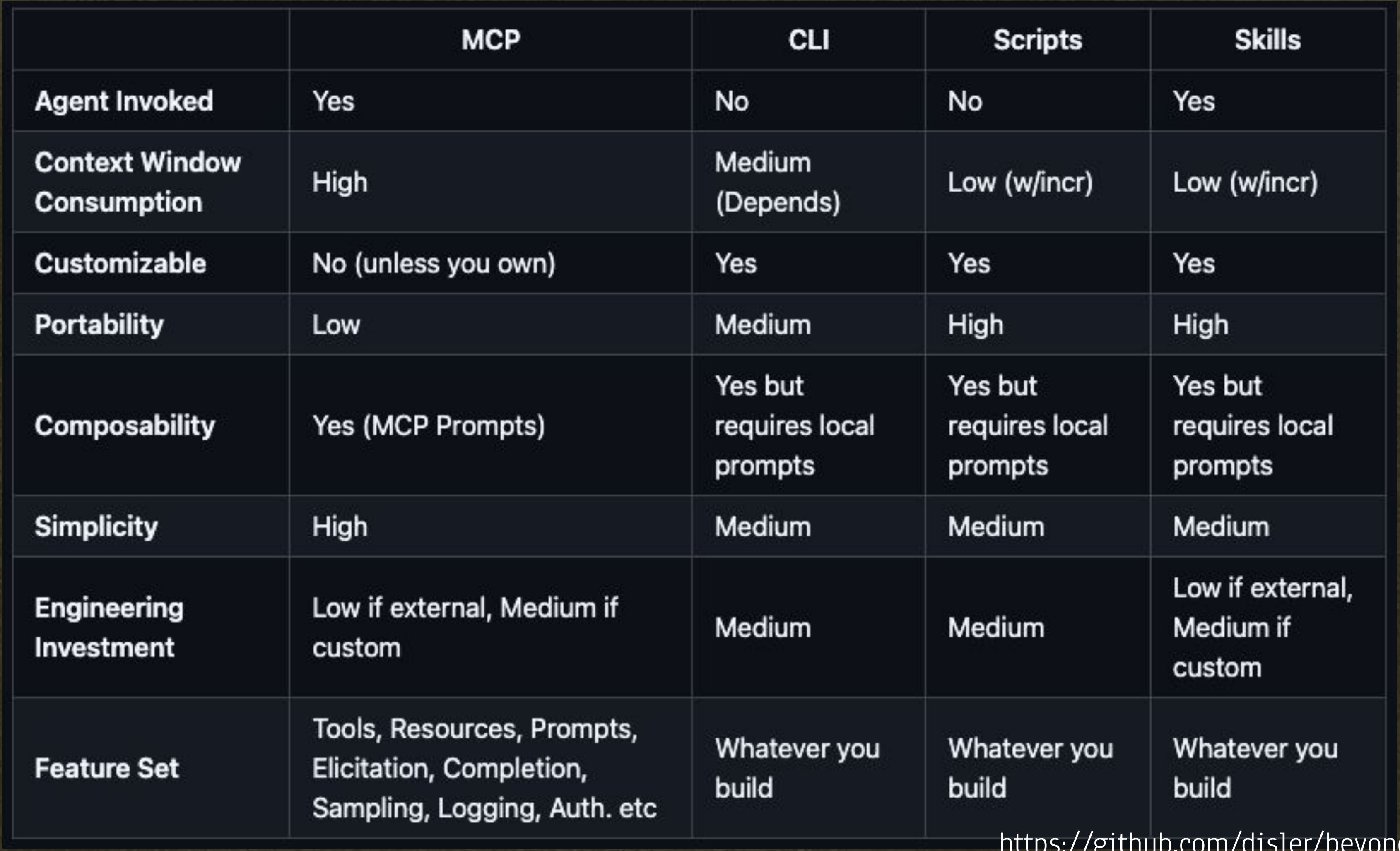
If you can run script, so can LLM

Skills

Progressive Disclosure for saving context

CLI

Scripts but wrapped in a single tool



	MCP	CLI	Scripts	Skills
Agent Invoked	Yes	No	No	Yes
Context Window Consumption	High	Medium (Depends)	Low (w/incr)	Low (w/incr)
Customizable	No (unless you own)	Yes	Yes	Yes
Portability	Low	Medium	High	High
Composability	Yes (MCP Prompts)	Yes but requires local prompts	Yes but requires local prompts	Yes but requires local prompts
Simplicity	High	Medium	Medium	Medium
Engineering Investment	Low if external, Medium if custom	Medium	Medium	Low if external, Medium if custom
Feature Set	Tools, Resources, Prompts, Elicitation, Completion, Sampling, Logging, Auth. etc	Whatever you build	Whatever you build	Whatever you build

https://github.com/disler/beyond-mcp

One task, one tool - right tool

```
# Human (2011)
Friend: "Po ile stoi Jen?"
Adam:
    → turnOnPc()
    → checkConversionRateOnline()
    → formatResponse()
```

```
# MCP (2024)
User: "Convert 100 USD to EUR"
Claude orchestrates:
  → fetch_exchange_rate()
  → calculate_conversion()
  → format_response()
```

```
# Unix (1978)
cat application.log | grep ERROR | awk '{print $4}' | sort | uniq -c
```

What part of MCP did you not understand?