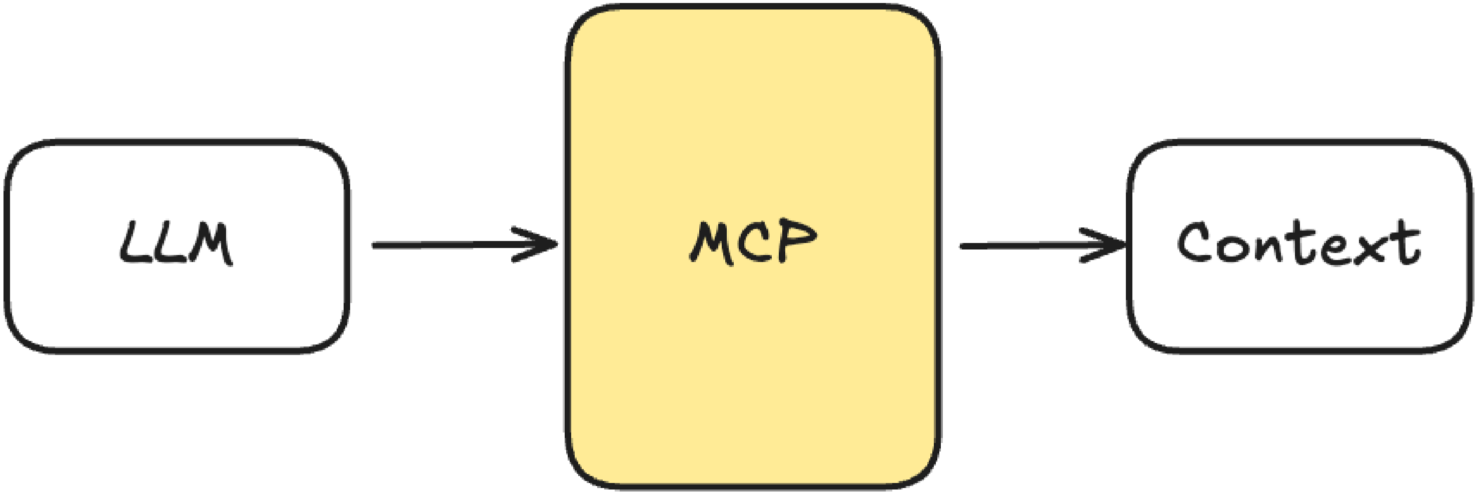
Building Agents with MCP

The HTTP Moment of AI?

Introduction to MCP

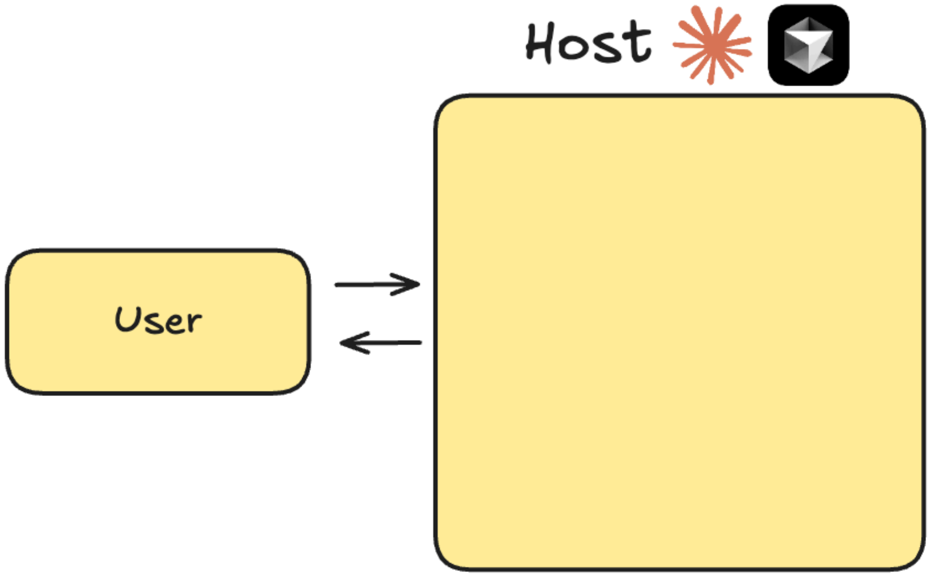
What is MCP?

Open Protocol to standardize connections between LLMs and Context

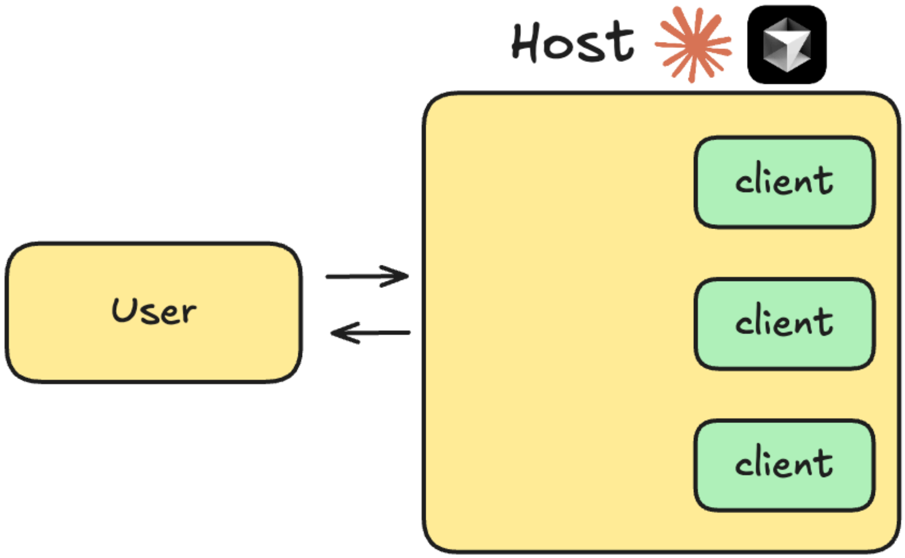


MCP is what makes AI actually useful for real apps

MCP Core Components



Host
User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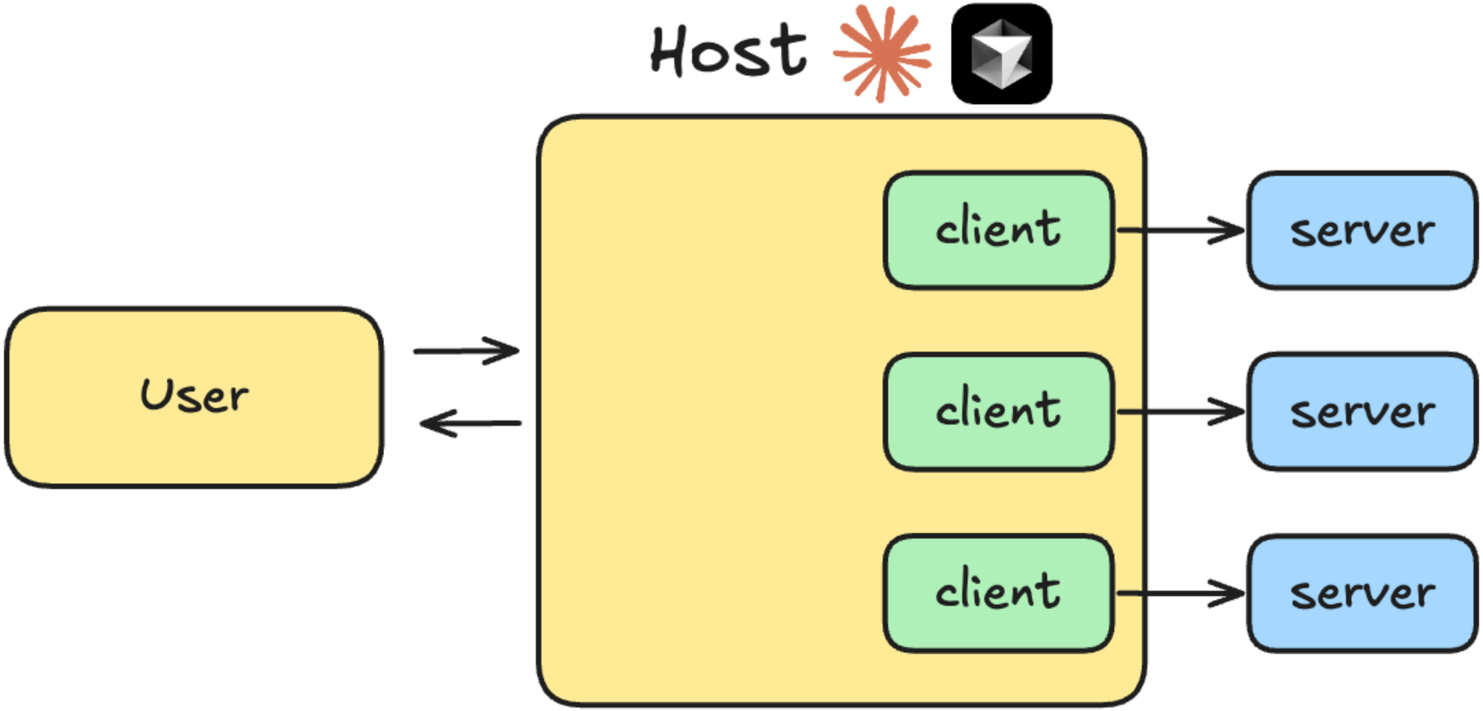
client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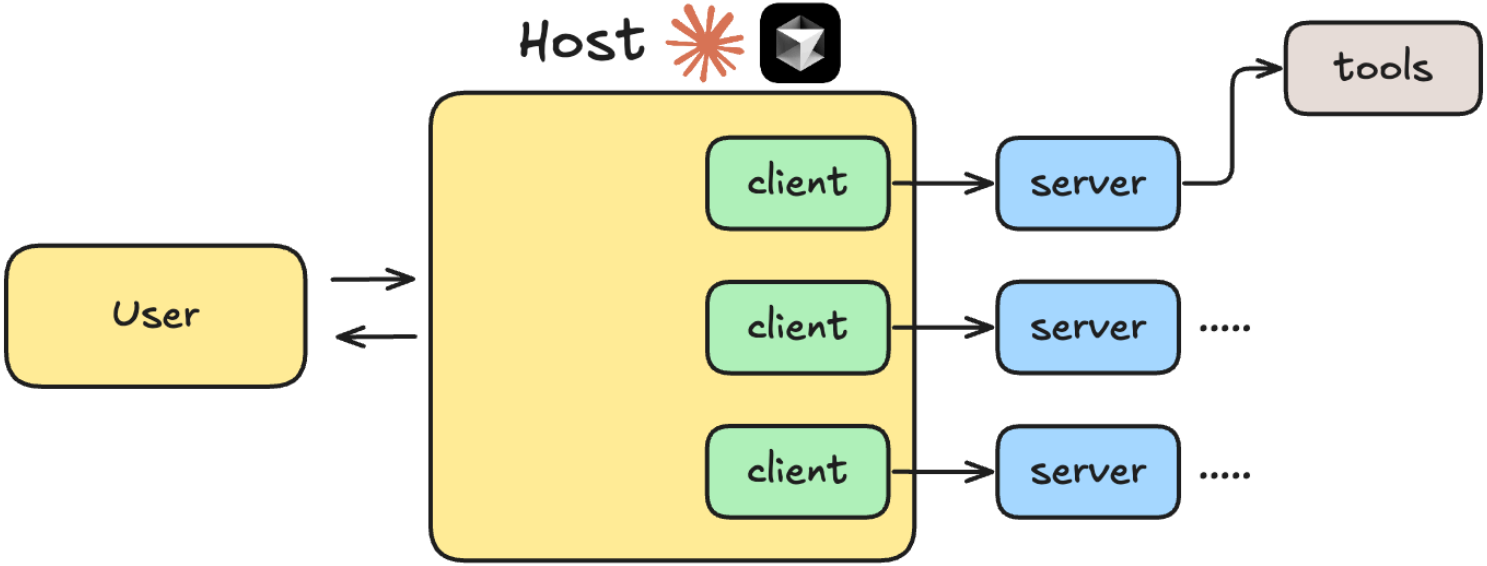


Host

client

client

client

server

server

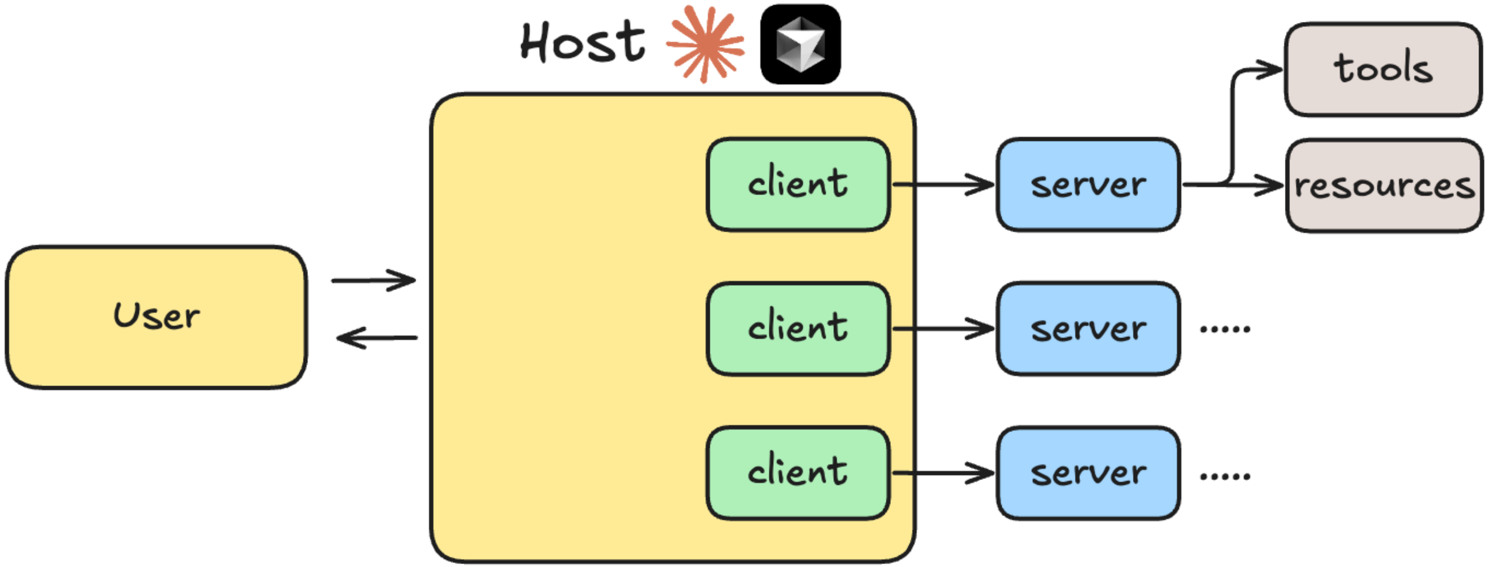
server

tools

User

.....

.....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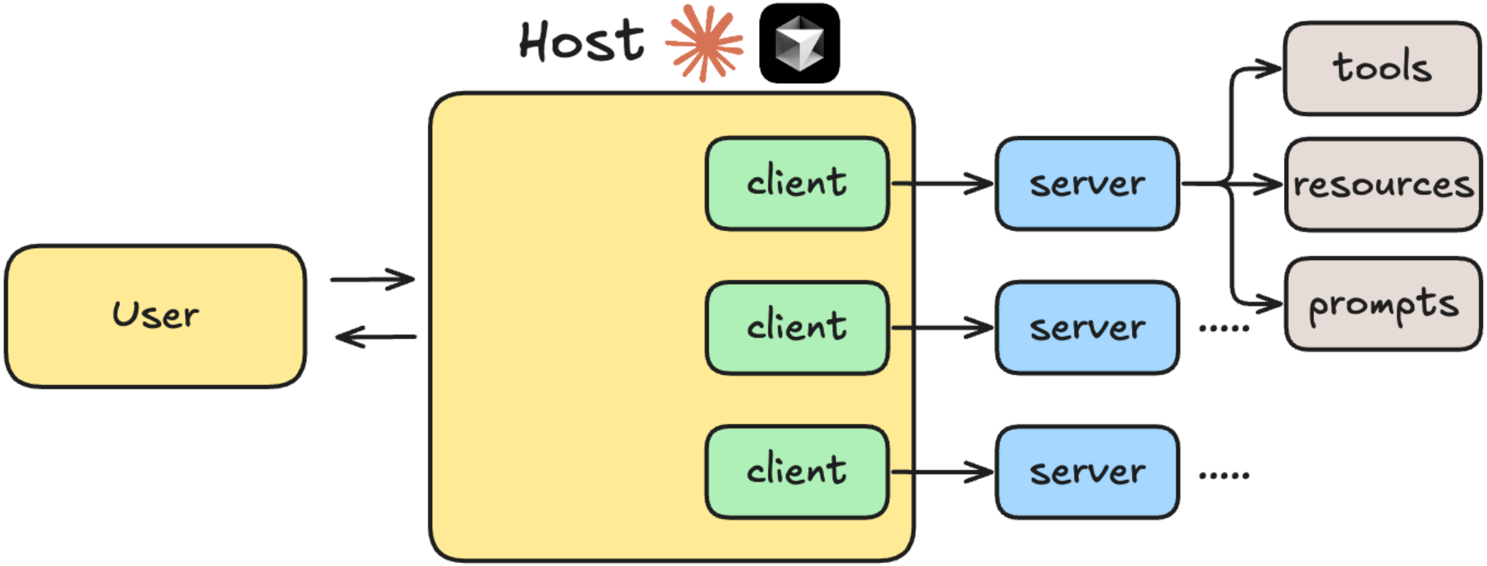
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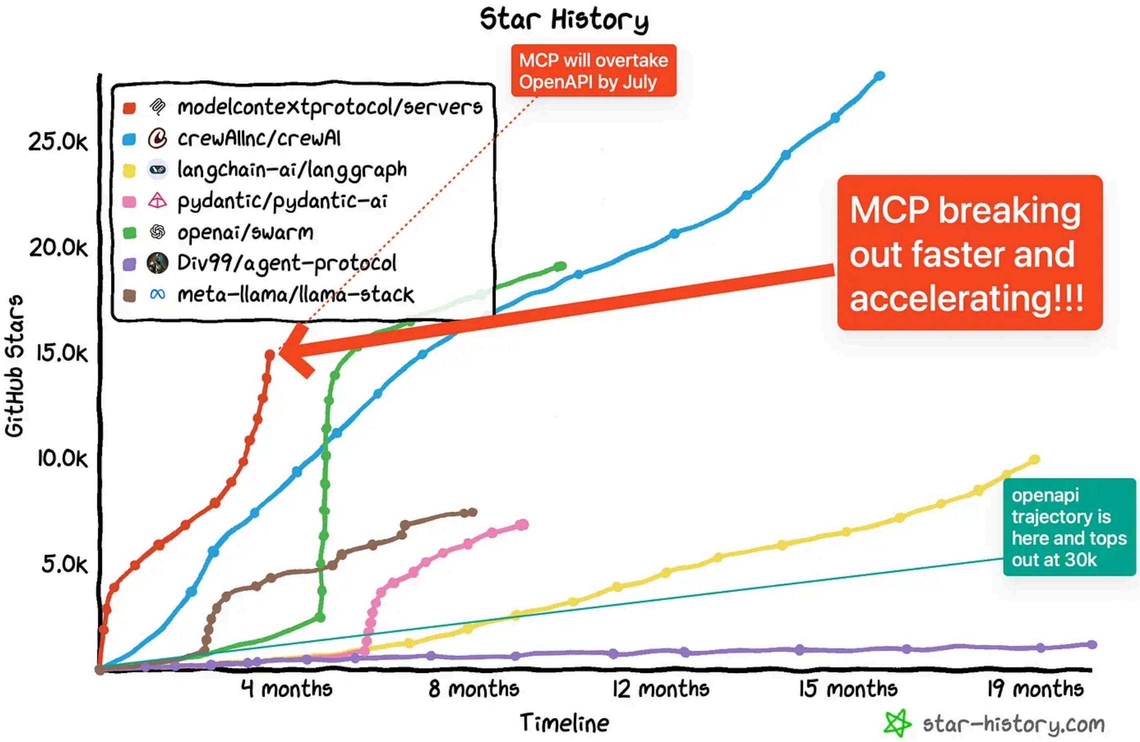
tools
resources
prompts

MCP is Growing Super Fast



MCP will overtake OpenAPI by July

MCP breaking out faster and accelerating!!!

openapi trajectory is here and tops out at 30k

Host

- User-facing AI application (ChatGPT, Claude Desktop, Cursor)

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- Manages capability discovery and invocatio

Server

- External program/service exposing capabilities

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- Lightweight wrapper around existing functionality

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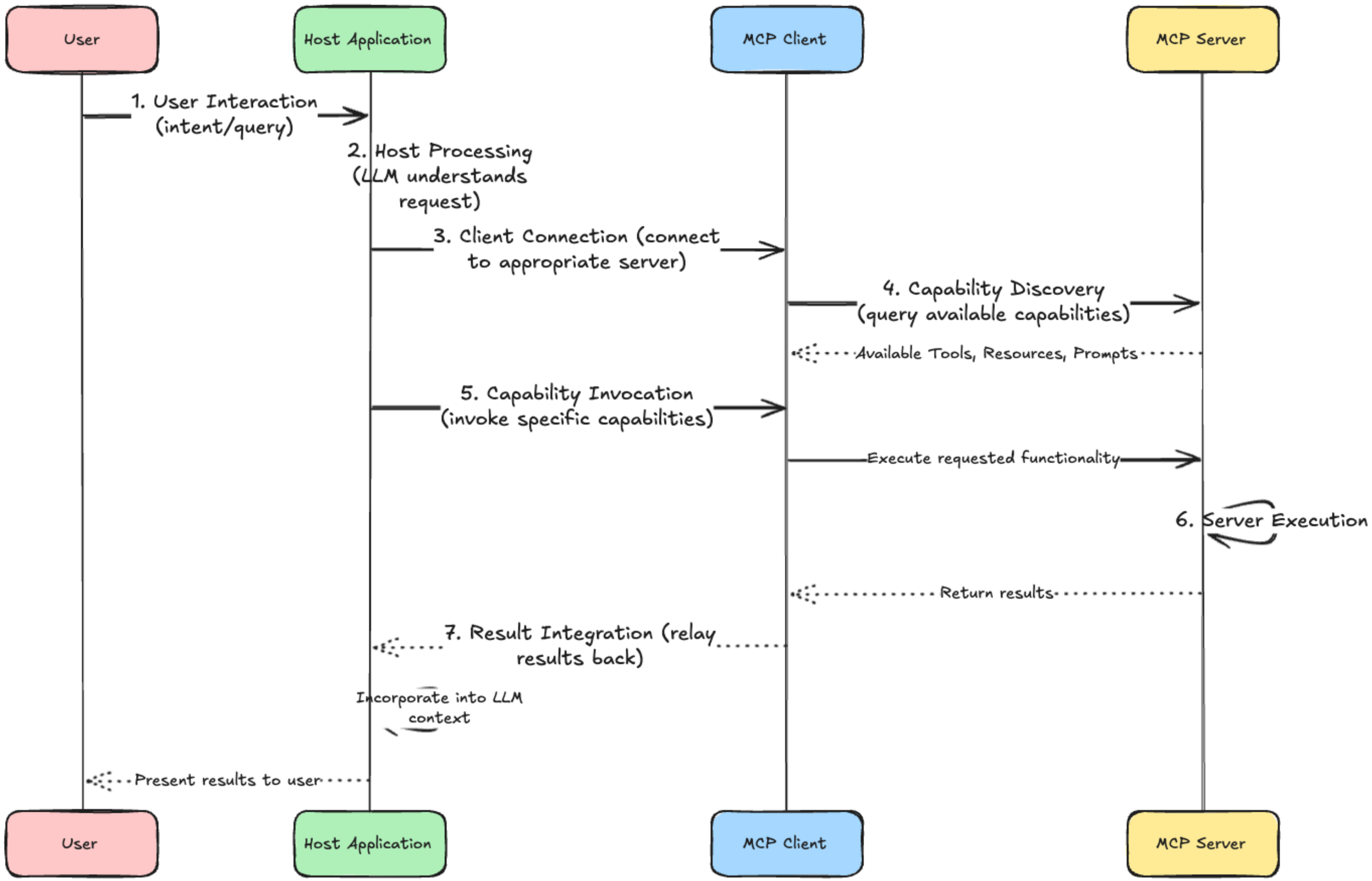
- Exposes capabilities in standardized format
- Provides access to tools, data sources, or services

Communication Flow



User

Host Application

MCP Client

MCP Server

1. User Interaction (intent/query)

2. Host Processing (LLM understands request)

3. Client Connection (connect to appropriate server)

4. Capability Discovery (query available capabilities)

Available Tools, Resources, Prompts

5. Capability Invocation (invoke specific capabilities)

Execute requested functionality

6. Server Execution

Return results

7. Result Integration (relay results back)

Incorporate into LLM context

Present results to user

User

Host Application

MCP Client

MCP Server

Communication Flow

1. **User Interaction**
2. **Host Processing**
3. **Client Connection**
4. **Capability Discovery**
5. **Capability Invocation**
6. **Server Execution**
7. **Result Integration**

Demo - Practical Introduction to MCP SDK

Demo - Creating our First MCP Server

(and using it with Claude Desktop!)

MCP Capabilities: Tools, Resources, Prompts & Sampling

MCP Capabilities

Core Primitives

- **Tools**

Core Primitives

- **Tools**
- **Resources**

Core Primitives

- **Tools**
- **Resources**
- **Prompts**

Core Primitives

- **Tools**
- **Resources**
- **Prompts**
- **Sampling**

Tools

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- Example: Fetching GitHub repository data, sending emails, or updating a database

```python
def send_email(to: str, subject: str, body: str) -> str:
    """
    Send an email to the given address
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    ... # Implementation logic
    return {
        "status": "success"
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- **Tools** are the most powerful MCP capabilities

Resources

Resources

- Application-controlled data access

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- Read-only operations

Resources

- Application-controlled data access
- Read-only operations
- Example: File contents, database records

```python
def get_file_contents(file_path: str) -> str:
    """
    Get the contents of a file
    """
    ... # Implementation logic
    return {
        "contents": "File contents"
    }
```

Prompts

- User-controlled templates

Prompts

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- Structure interactions

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- Guide workflows

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- User-controlled templates
- Structure interactions
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- Example: Code review templates

```python
def plan_project(project_name: str) -> str:
    """
    Plan a project
    """
    ... # Implementation logic
    return {
        "plan": "Project plan"
    }
```

Sampling

- Server-initiated LLM interactions

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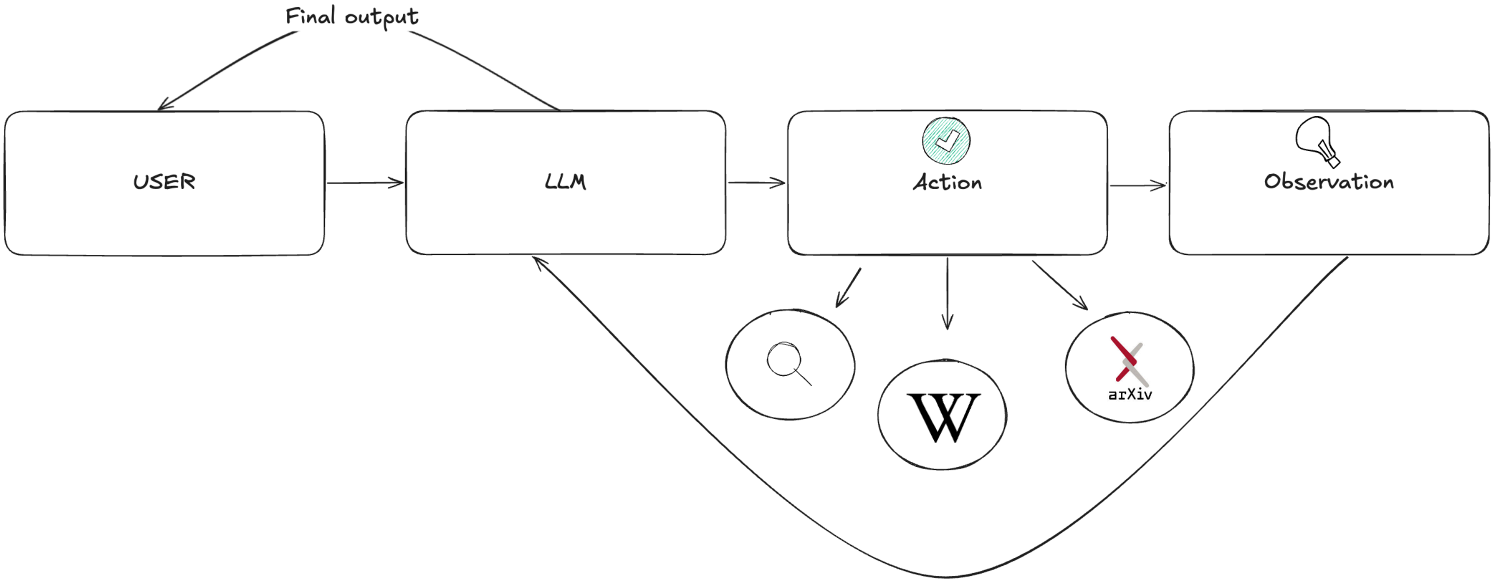
- Example: Multi-step analysis

```python
def request_sampling(messages, system_prompt=None, include_context="none"):
    """Request LLM sampling from the client."""
    ... # Implementation logic
    return {
        "role": "assistant",
        "content": "Analysis of the provided data..."
    }
```

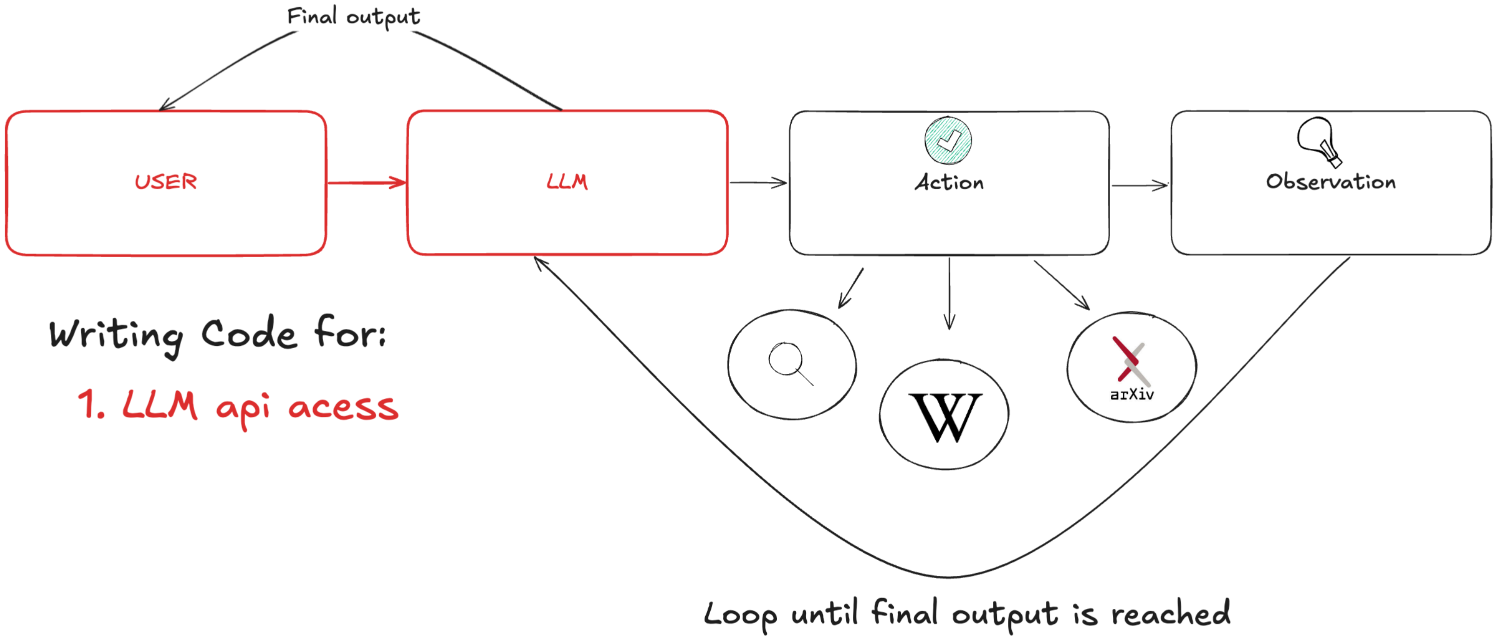
Whiteboard - How MCP Capabilities Work Together

Demo - Implementing MCP Tools, Resources, Prompts & Sampling

Building Agents with MCP



Loop until final output is reached



Writing Code for:

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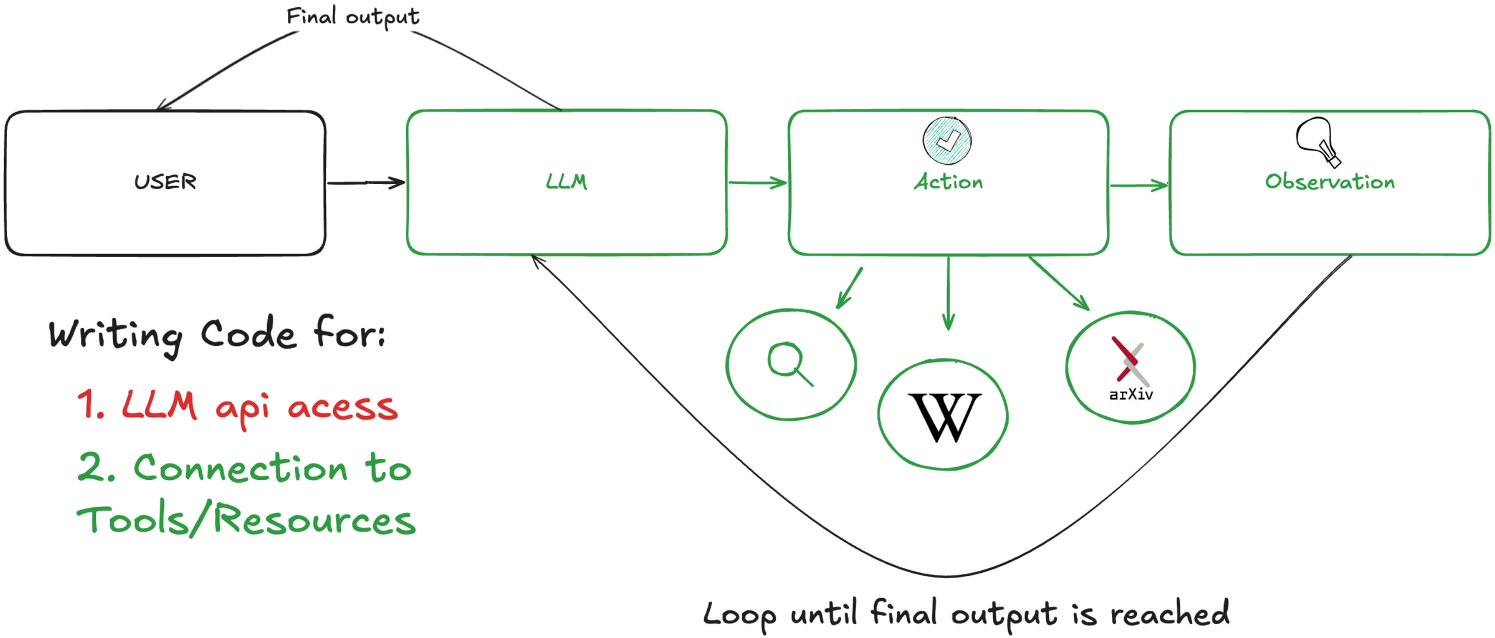

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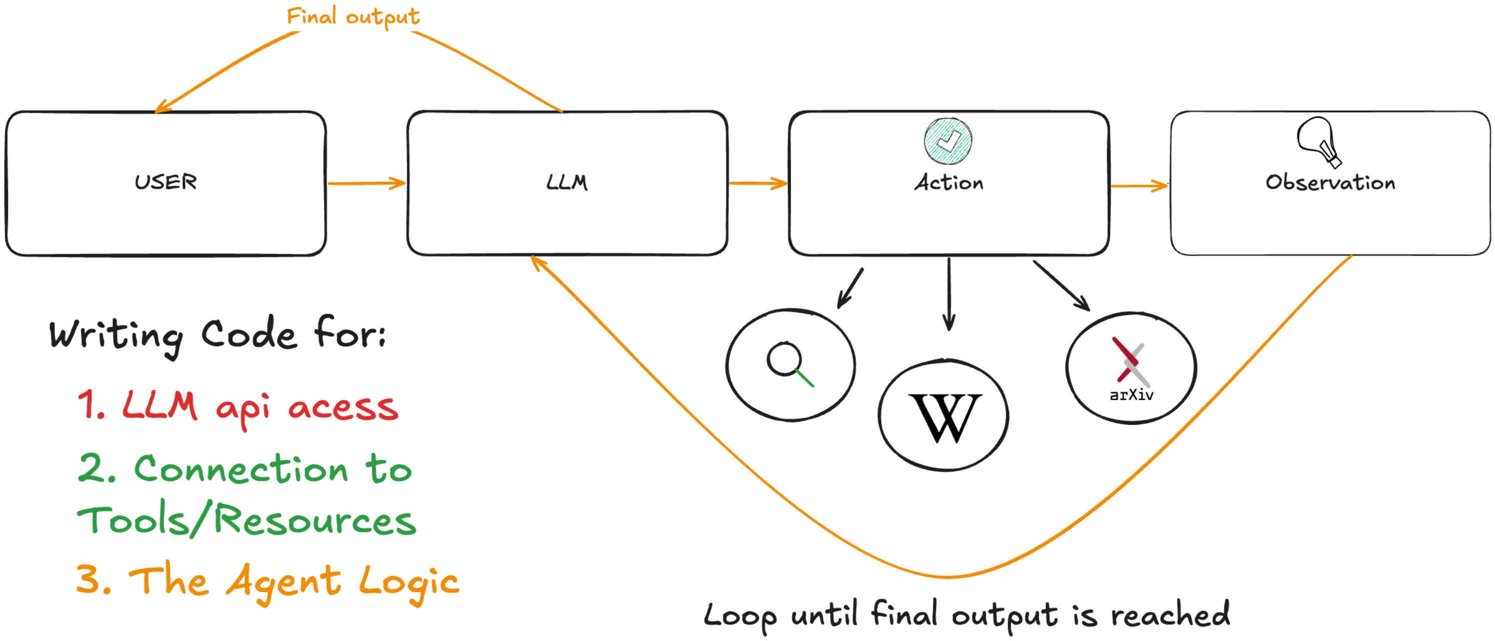
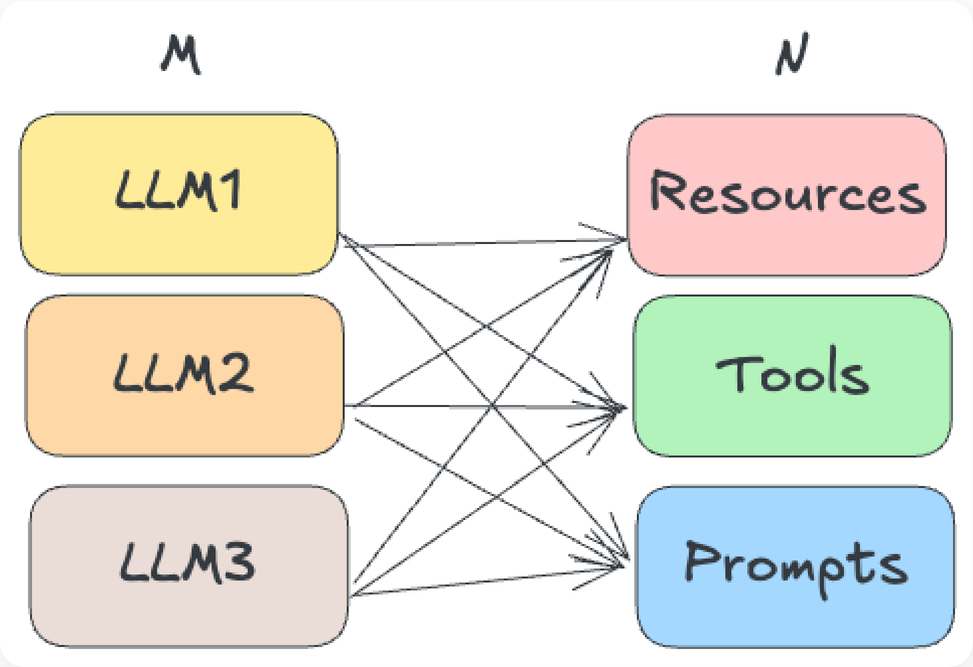


Writing Code for:

1. LLM api acess
2. Connection to Tools/Resources
3. The Agent Logic

The MN Integration Problem: Multiple LLMs



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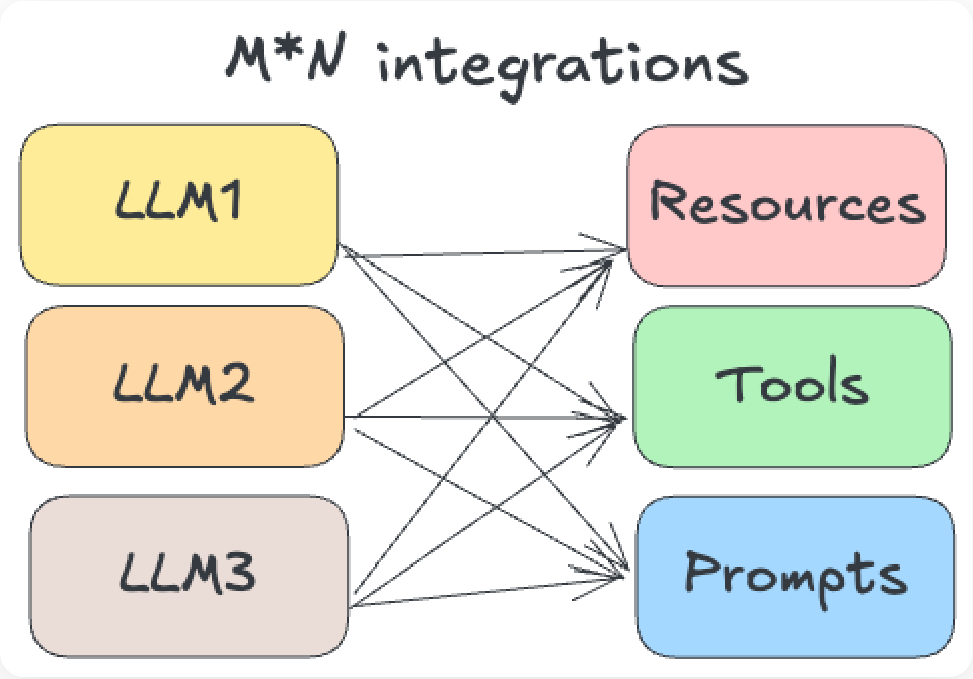

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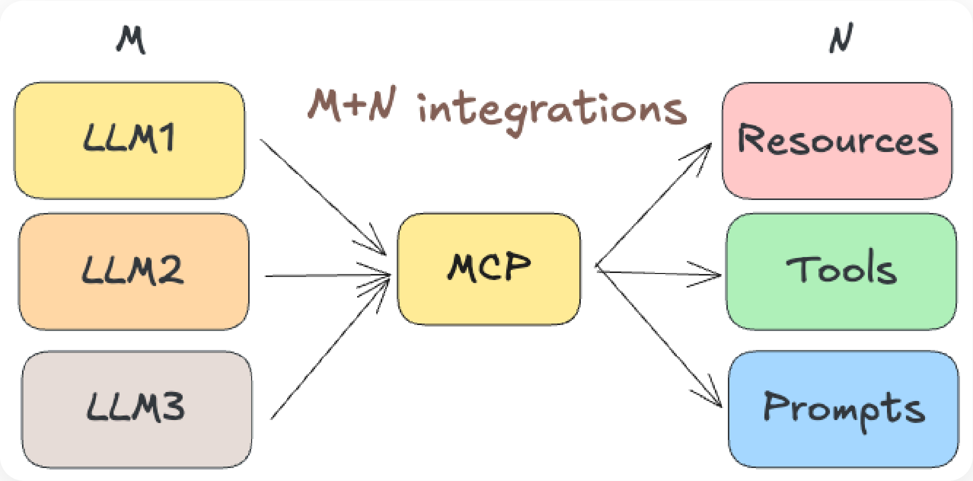
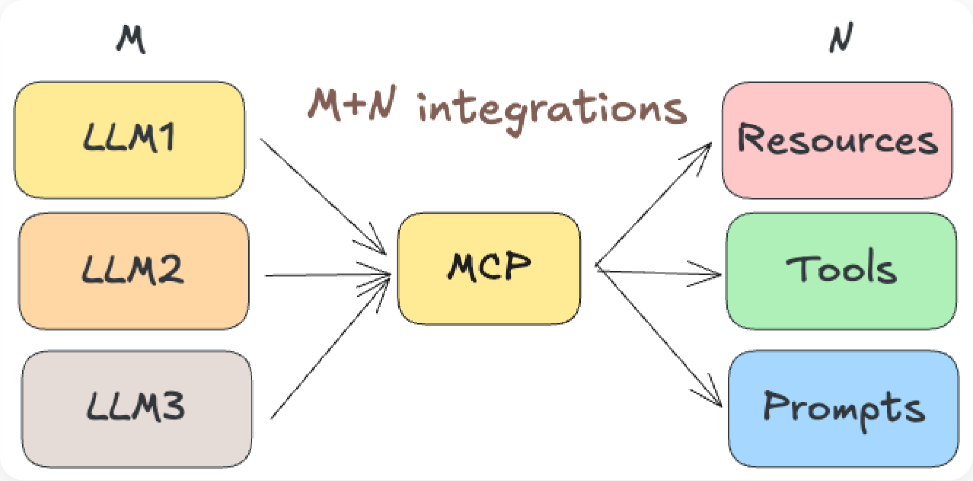


MCP Simplifies the Integration of Problem for Agent Development



Whiteboard - Agent Development in the Era of MCP

Demo - Building Agents with MCP Using Google's ADK

Demo - Building Agents with MCP Using LangGraph

Demo - Building Agents with MCP Using OpenAI's Agent SDK

Workflow Automation Revolution

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- Development environments with intelligent tooling (Claude-Code, Cursor)
- Multi-Language Support (Python, TypeScript, Swift, Kotlin, Java, Go)

Fun Demo Time! - Using MCP from Claude Desktop and Cursor! Hacks, Tips, and Tricks!

MCP Security Considerations

⚠️ Security Risks: MCP Vulnerabilities

- **Critical "Tool Poisoning Attacks" Discovered**

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Key Takeaway: Extensive guardrailing needed for production deployments

The Protocol "Wars"

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MCP vs A2A vs ACP

Three Major Players Competing/Complimenting? for Standardization:

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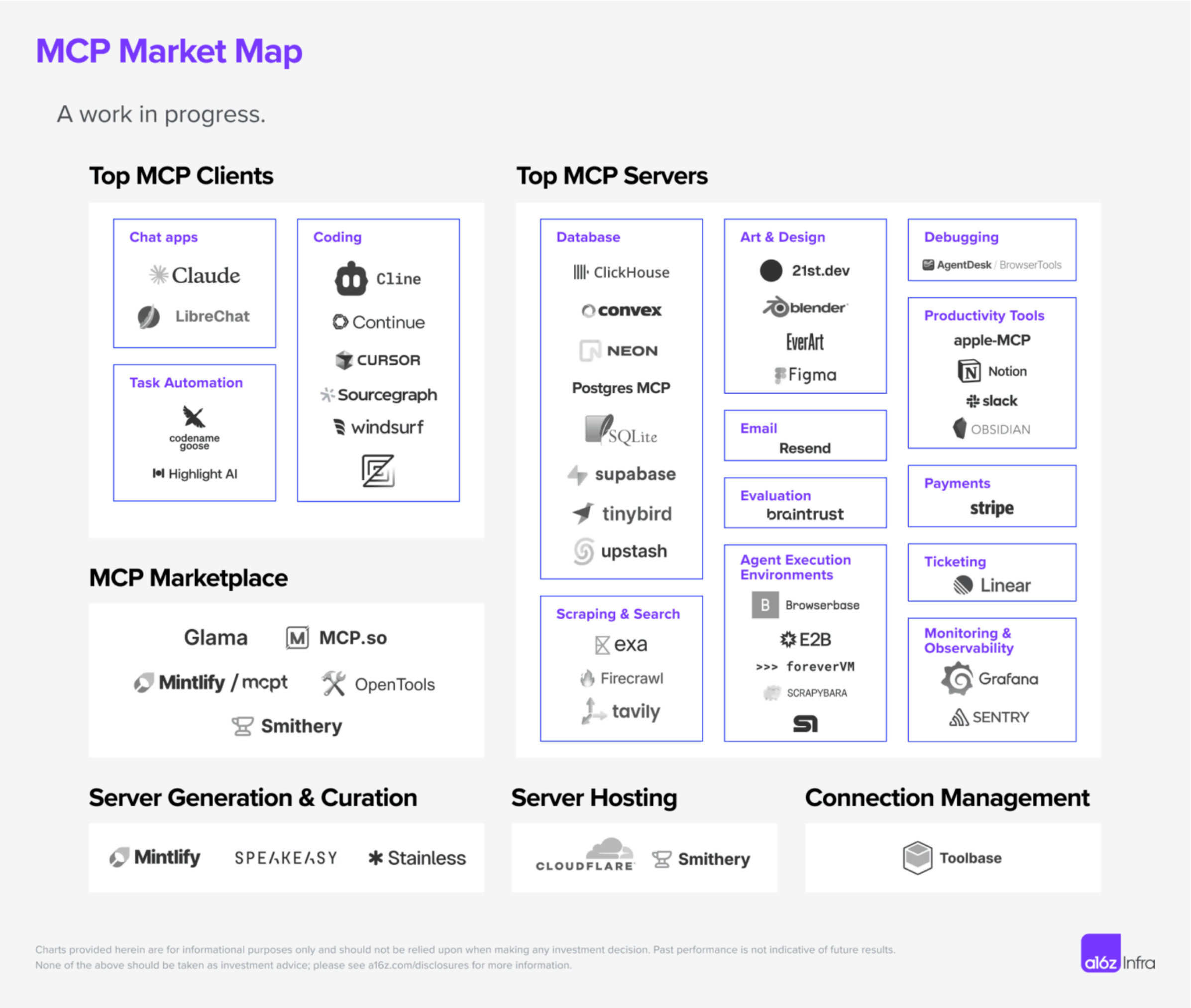
Current Reality: Fragmentation risk vs innovation through competition

The Growing MCP Ecosystem



MCP Market Map

A work in progress.

Top MCP Clients

Chat apps
- Claude
- LibreChat

Coding
- Cline
- Continue
- CURSOR
- Sourcegraph
- windsurf

Task Automation
- codename goose
- Highlight AI

Top MCP Servers

Database
- ClickHouse
- convex
- NEON
- Postgres MCP
- SQLite
- supabase
- tinybird
- upstash

Scraping & Search
- exa
- Firecrawl
- tavily

Art & Design
- 21st.dev
- blender
- EverArt
- Figma

Email
- Resend

Evaluation
- braintrust

Agent Execution Environments
- Browserbase
- E2B
- >>> foreverVM
- SCRAPYBARA

Debugging
- AgentDesk / BrowserTools

Productivity Tools
- apple-MCP
- Notion
- slack
- OBSIDIAN

Payments
- stripe

Ticketing
- Linear

Monitoring & Observability
- Grafana
- SENTRY

MCP Marketplace

- Glama
- MCP.so
- Mintlify / mcpt
- OpenTools
- Smithery

Server Generation & Curation

- Mintlify
- SPEAKEASY
- Stainless

Server Hosting

- CLOUDFLARE
- Smithery

Connection Management

- Toolbase

Charts provided herein are for informational purposes only and should not be relied upon when making any investment decision. Past performance is not indicative of future results. None of the above should be taken as investment advice; please see a16z.com/disclosures for more information.

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Whiteboard + Demo - Practical MCP Security Tips

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