Intro to Model Context Protocol(MCP) in .Net

Praveen Raghuvanshi

@praveenraghuvan

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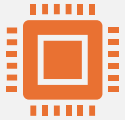
Introduction



Technical Architect @ Harman, A Samsung Company

Area of Expertise : Building Cloud Native applications

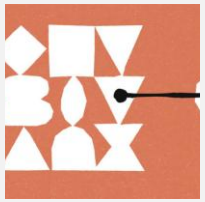
Area of Interest : AI/ML, LLMs, SDV

Location: Bangalore, India

Agenda

- What is Model Context Protocol(MCP) ?
- Why do we need MCP?
- Architecture of MCP?
- How MCP works ?
- Building MCP server in C#

What is Model Context Protocol (MCP) ?



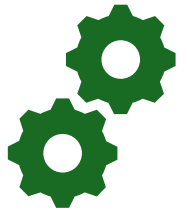
A protocol defined by Anthropic in Nov 2024

MCP is a standard protocol for connecting applications to Large Language Models (LLMs).

Think of it as a universal connector for AI applications.

Why MCP ?

Standardization: Provides a consistent way to connect AI models to data sources.



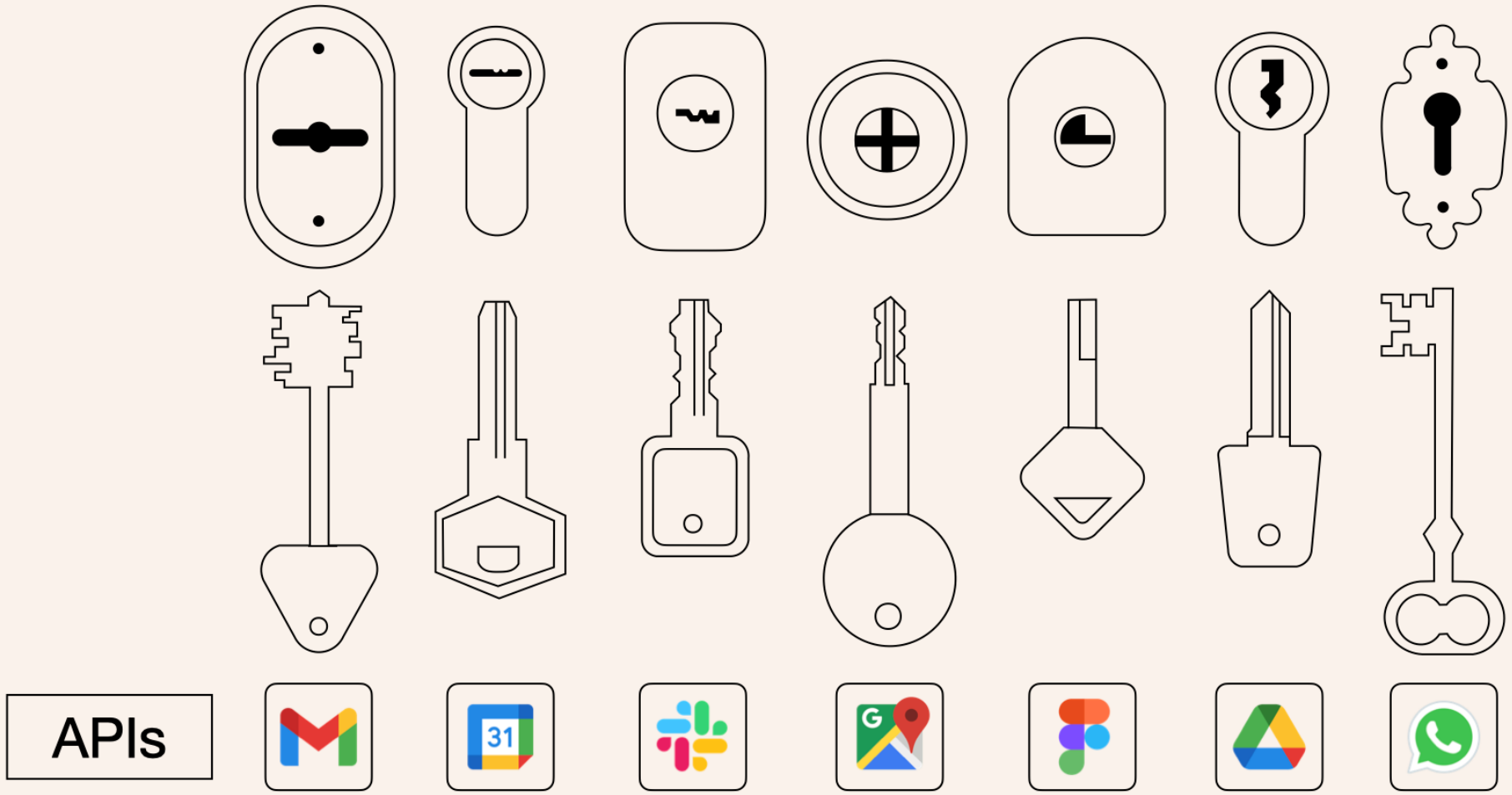
Integration: Enhances LLM capabilities by integrating with various tools and data.

Flexibility: Allows switching between different LLM providers.

Security: Ensures secure data handling.

APIs: Every tool needs its own key

Traditional APIs require different authentication and integration for each service,
like needing different keys for different locks



Source: https://norahsakal.com/blog/mcp-vs-api-model-context-protocol-explained/

Why MCP ?

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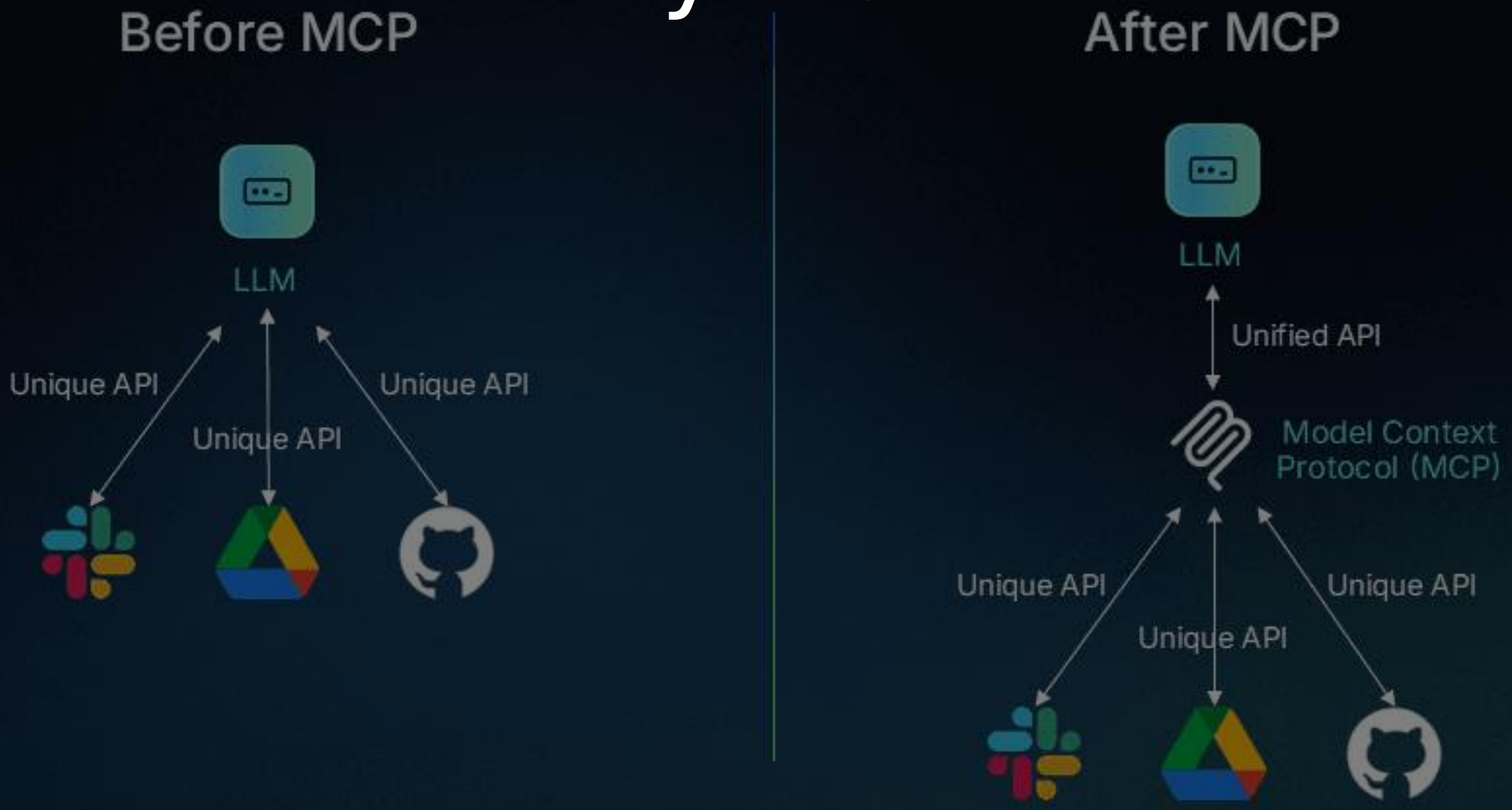


Source: https://www.descope.com/learn/post/mcp

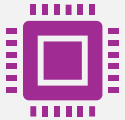
MCP Architecture

(Client-Server)

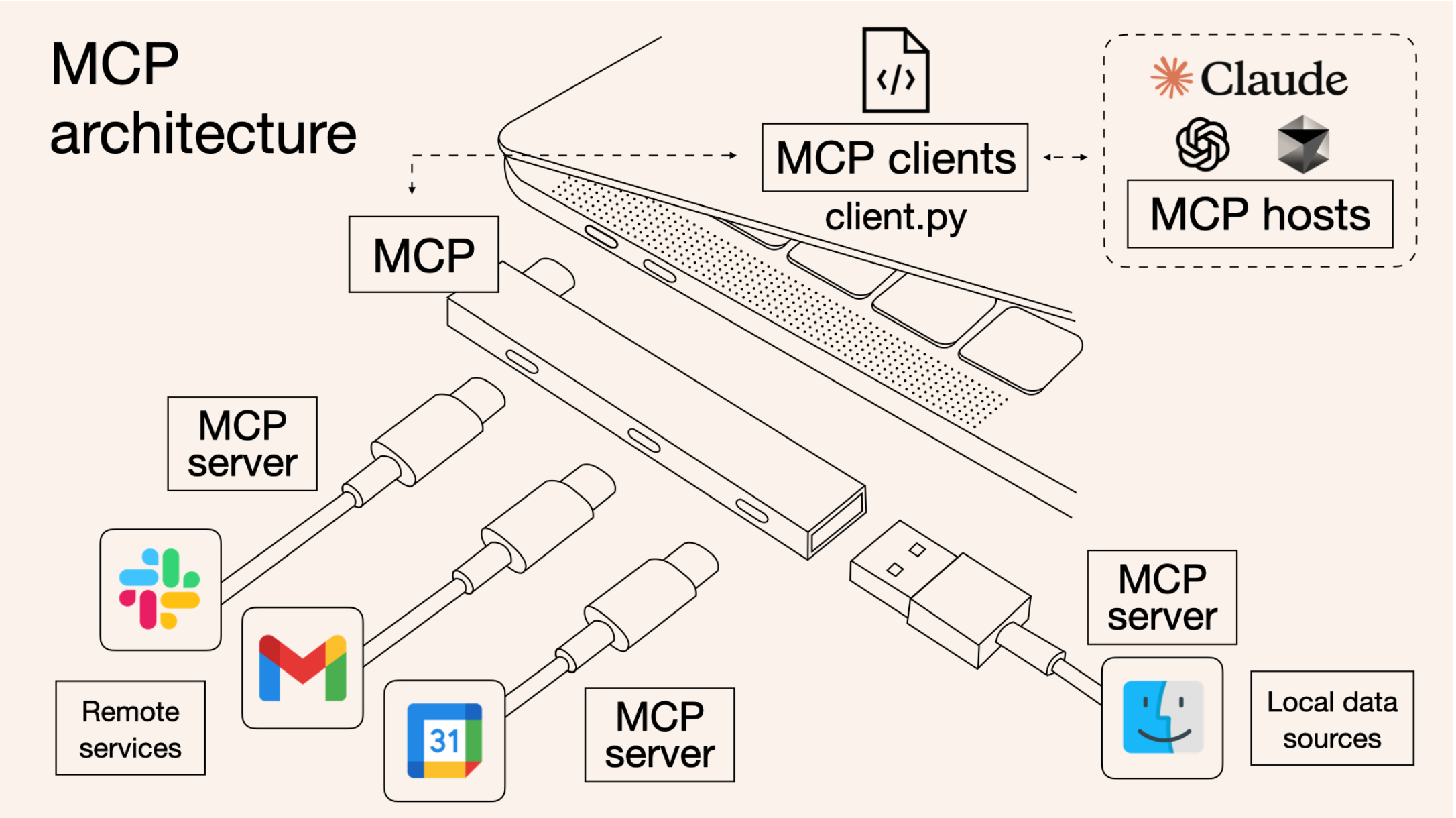
MCP Hosts: Programs that want to access data through MCP.

MCP Clients: Maintain connections with servers.

MCP Servers: Expose specific capabilities through MCP.



Transport Layer: STDIO and HTTP + SSE(Server-Side Events)



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MCP Architecture

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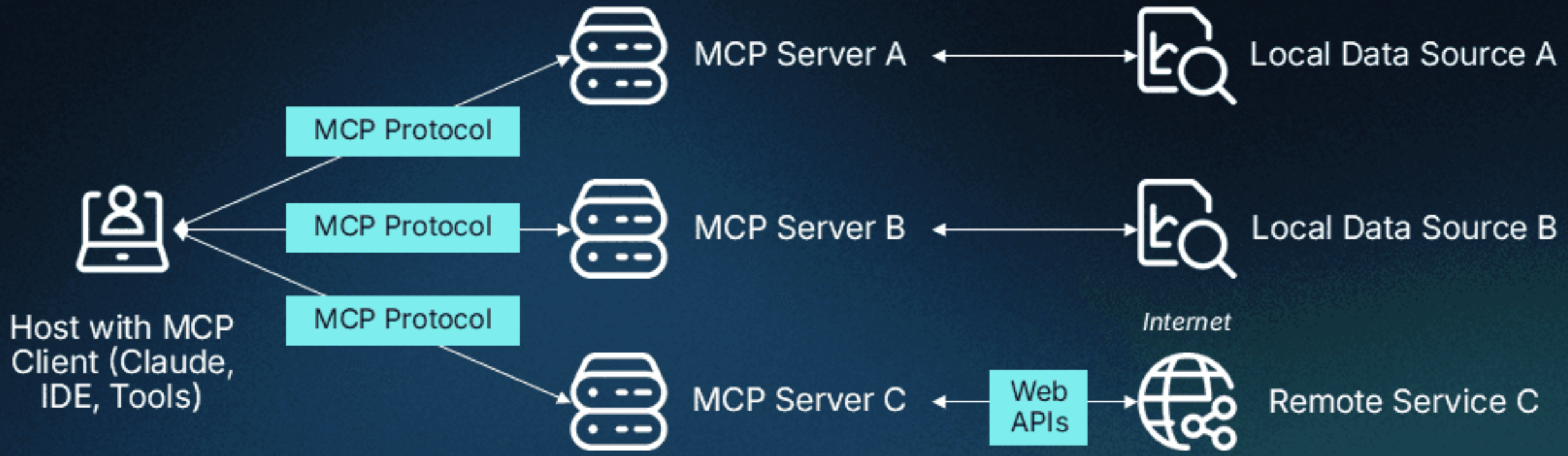

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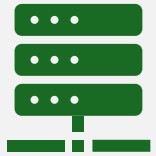
How MCP works ?

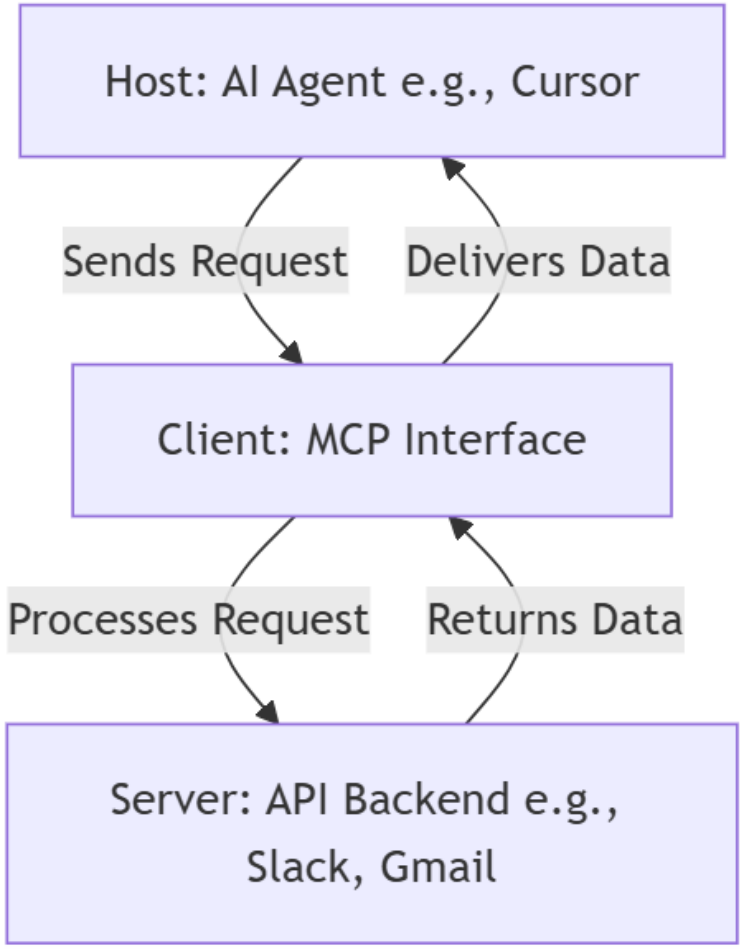
Host requests data.



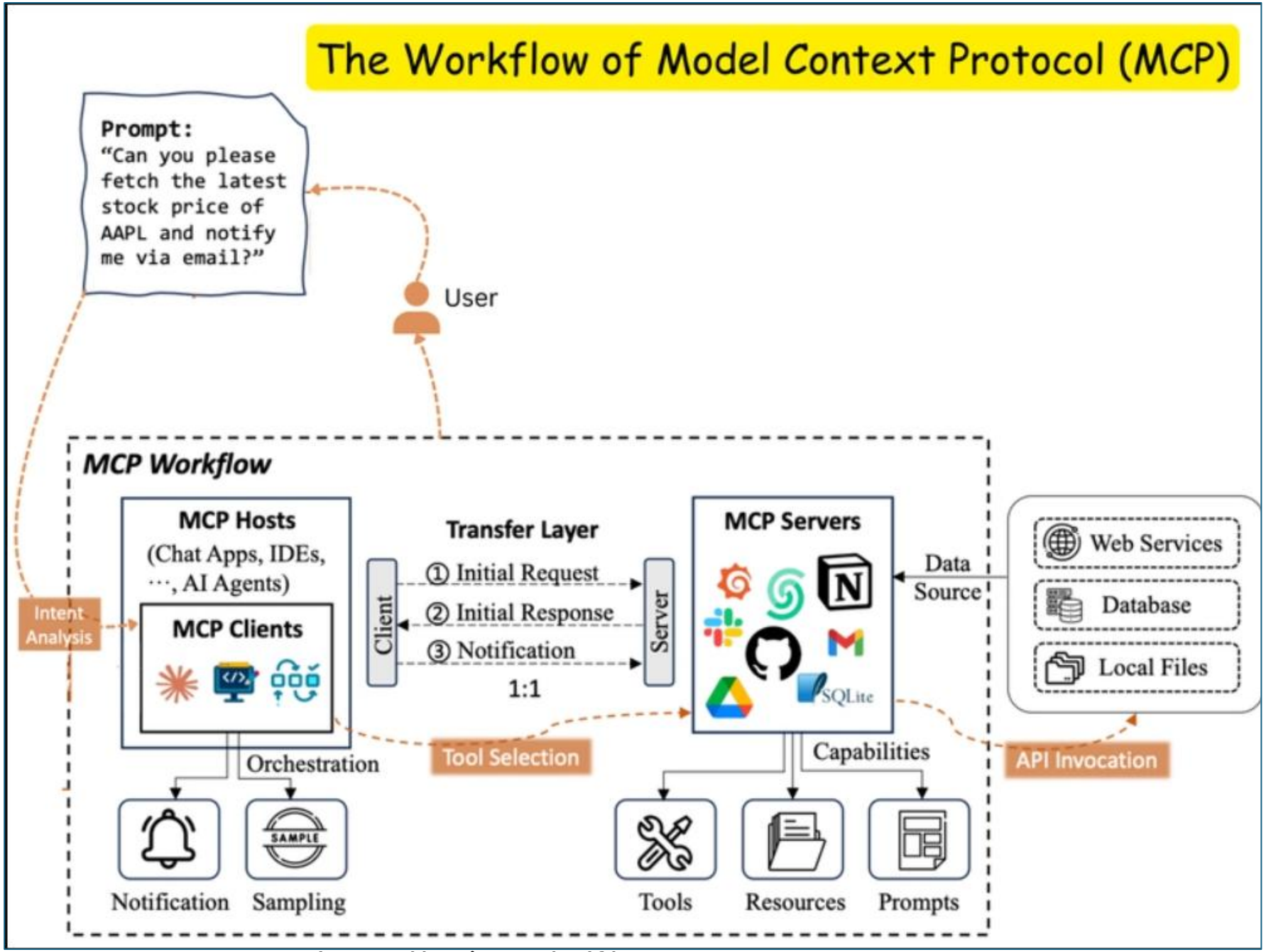
Client connects to the server.

Server provides the requested data.

How MCP works ?



Source: https://ssojet.com/blog/the-model-context-protocol-mcp-explained-a-game-changer-for-ai-and- startups/



https://arxiv.org/pdf/2503.23278

Distribution

Source Code Package

Docker

MCP Server – Time Source Code - Packages

- Microsoft.Extensions.Hosting
- ModelContextProtocol

```
using Microsoft.Extensions.Hosting;
using ModelContextProtocol.Server;
```

MCP Server – Time Source Code - Server

```
6   Console.WriteLine("Starting MCP .Net BLR server...");
7
8   var builder = Host.CreateApplicationBuilder(args);
9   builder.Services
10      .AddMcpServer()
11      .WithStdioServerTransport()
12      .WithToolsFromAssembly();
13
14  await builder.Build().RunAsync();
15
16  Console.WriteLine("MCP .Net BLR server stopped.");
17
```

MCP Server – Time Source Code - Tool

```
19    [McpServerToolType]
      0 references
20    public class TimeTool
21    {
22        [McpServerTool, Description("Get the current time")]
          0 references
23        public string GetCurrentTime()
24        {
25            return DateTime.UtcNow.ToString("o");
26        }
27    }
```

Demo

References

https://arxiv.org/pdf/2503.23278

https://github.com/modelcontextprotocol/csharp-sdk

https://devblogs.microsoft.com/dotnet/build-a-model-context-protocol-mcp-server-in-csharp/

https://laurentkempe.com/2025/03/22/model-context-protocol-made-easy-building-an-mcp-server-in-csharp/

Thank you – Q & A

https://in.linkedin.com/in/praveenraghuvanshi

https://github.com/praveenraghuvanshi

@praveenraghuvan

https://t.me/joinchat/lifUJQ_PuYT757Turx-nLg