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Basics of MCPs. Why and what !

Understanding basics of MCPs and why they came in picture when we have such powerful LLMs.

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Chinmay Bhalerao Follow

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LLMs have limitations.
They **can** answer your questions, write procedures, provide step-by-step instructions, perform text understanding and generation, reasoning and problem-solving, and knowledge retrieval.

But LLMs **cannot** perform actions like executing code, sending emails, carrying out ordered ste

We often think LLMs can do a lot of things, but they are essentially advanced prediction models that are very good at generating text.

If you are familiar with Cursor, Augment, or GitHub Copilot, then you know they use LLMs to execute changes like reading, writing, or updating files. It’s interesting to see how these tools combine the prediction power of LLMs with actual execution of actions.

The idea is, I can make different tools for different functionalities. For example, like Cursor or Copilot, I can have a **read tool**, **write tool**, **update tool**, **database interaction tool**, **console executor**, or **Google search tool**.

But I also need to ensure that these tools follow some kind of protocol when being created.

You can think of it like REST API protocols. We use REST APIs in a standardized way to connect front end and back end. For LLMs, we currently don’t have a standardized protocol to connect inputs and outputs.

For example, APIs use standard status codes. Everyone knows and accepts worldwide what each status code means, so it’s easy to adapt and use. Similarly, for connecting or authentication, we have the right set of protocols that everyone follows.

In the same way, while connecting with LLMs or designing tools for LLMs, we also need to consider some kind of protocol.

For this purpose, Anthropic introduced an interesting idea called **Model Context Protocols (MCP).**

A **protocol** that defines how AI models can **communicate with external contexts** (like APIs, databases, code repos, or plugins). It helps AI systems fetch the **right information at the right time** instead of relying only on their pre-training.

External data sources → e.g., a company's database, APIs, documents, logs.

Tools and services → e.g., Jira, GitHub, Slack, SQL, cloud APIs.

Local environment → e.g., files on your machine, configs, code repos.

This **context** is *not* part of the model's training weights — it's something the model can access **dynamically at runtime** via MCP.

> *Why context is important ?*

There are thousands of repositories, but the LLM needs to know **which repo to take and work with**. We don't want generalized solutions — we want solutions related to our specific context and problems.

So **context** can be tools, environments, prompts, or resources.

> *What is a Protocol?*

A **protocol** in computing is a set of rules and standards that define how two systems communicate with each other.

It’s similar to the requests we make to connect with APIs.

MCP client a

> *MCP Server*

The component that **provides context** (e.g., a data source, tool, or service). It *serves* the AI with information.

Examples:

> *GitHub MCP server → provides repository info.*
>
> *SQL MCP server → provides query results.*
>
> *Jira MCP server → provides ticket data.*

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MCP Client

The component that **consumes context** (usually the AI model or the app hosting it).It requests in wledge or actions.

Examples:

> *Claude (or GPT) acting as an MCP client → asks the GitHub MCP server:* “Give me open PRs.”

Your AI-powered app using MCP → connects to a SQL MCP server for data.

> Client = AI asking for context
> Server = Tool or data source providing context

What an MCP Server Contains

An MCP server is essentially a **wrapper around your data or tools,** so the AI client can use them safely.

It usually contains:

> ***APIs / Data Sources*** *→ The actual source of info (databases, APIs, files, logs).*
>
> *Example: Jira API, SQL database, file system.*
>
> ***Tools (Actions)*** *→ Small functions or commands the LLM can call.*
>
> *Example:* `list_issues` , `get_pull_requests` , `query_database` .
>
> ***Schema / Definitions*** *→ A structured description of what the server can do.*
>
> ***Security Rules*** *→ Define what the AI is allowed to do safely.*

Analogy

[This analogy I have take from ChatGPT to explain things in better way, Thank you ChatGPT]

Think of an MCP server like a **vending machine**:

> *Inside it has snacks (APIs/data).*
>
> *The buttons are the tools (actions).*

> *The labels are the schema (how to use them)*
>
> *The coin sl*
>
> *The client (AI) is just pressing buttons to get the right snack.*

Example: GitHub MCP Server

Contains: GitHub API connection.

Tools: `list_repos`, `get_pull_requests`, `create_issue`.

Schema: JSON definition of inputs needed.

Security: Allows reading repos, but not deleting.

So when the LLM (client) asks:

> *"Find all open PRs in repo XYZ."*

The MCP server:

1. Runs the GitHub API call.
2. Returns results in structured format.

> MCP Server = APIs + tools + schema + security rules
> Client = AI app that requests data
> Protocol = the rules for how they talk

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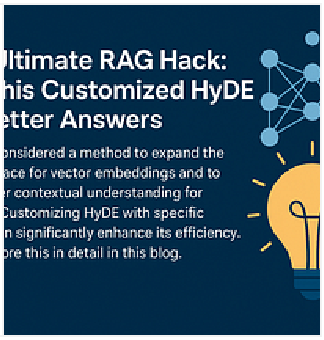

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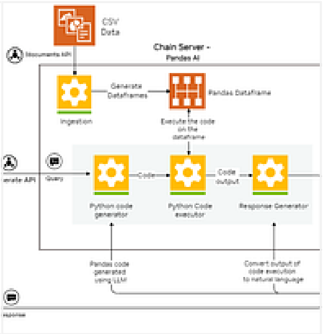

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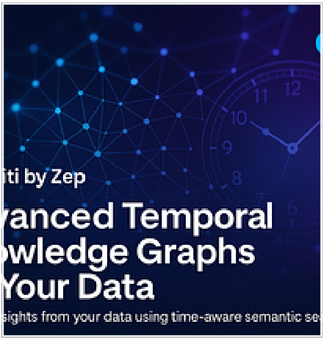

Signing off,

Chinmay !

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Model Context Protocol

Artificial Intelligence

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Written by Chinmay Bhalerao

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informational and simply explained.

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Nice to know this topic's philosophy !

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It's useful that MCPs define a standard protocol for LLMs to interact with external APIs and databases reliably.

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I’ve been experimenting with Model Context Protocol servers for a few months now, and I have to say, they’ve changed the way I work.

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