

# Introduction to agentic protocols



## MCP & A2A

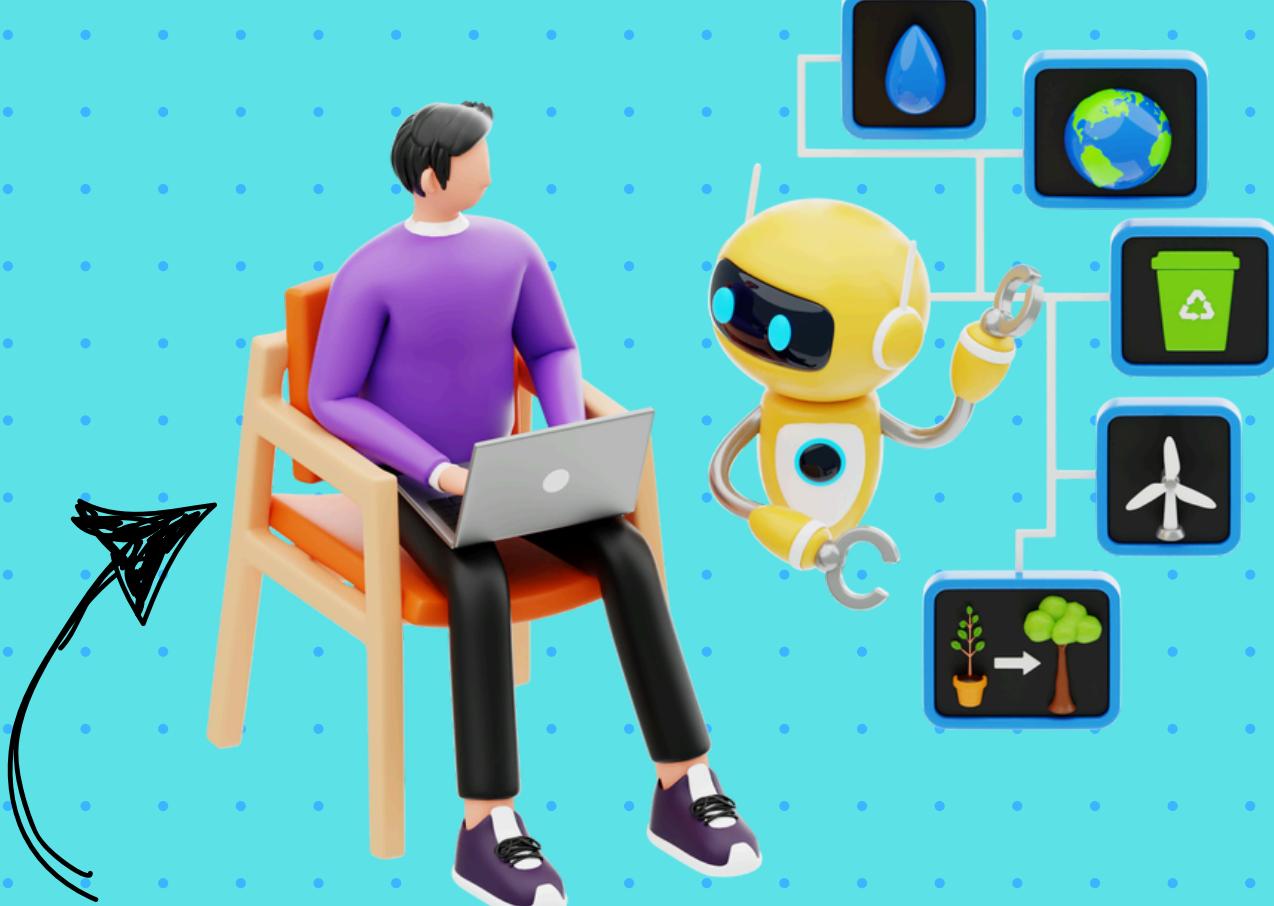
## Fundamentals

The Essentials to Get You  
Started with main AI Agent  
Protocols



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## Following topics are covered

- 1 Why Protocols?**
- 2 About MCP**
- 3 MCP Architecture**
- 4 About A2A**
- 5 A2A Key Concepts**
- 6 How MCP & A2A Work Together**
- 7 Key Takeaways**

# 1. Why Protocols



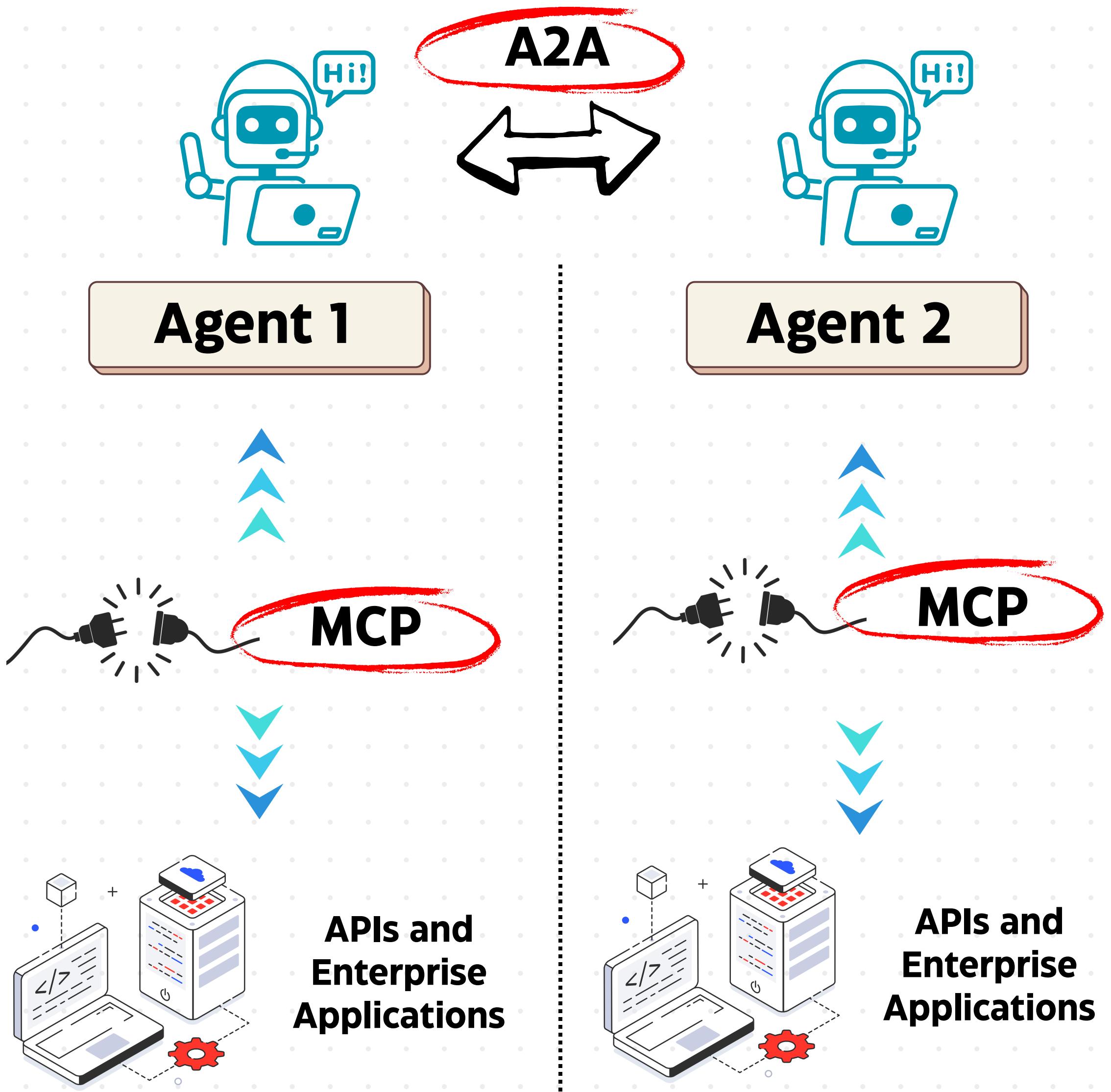
In AI systems, agents interact with two primary types of entities:

- ✓ **Tools & Resources** – Structured, predictable functions like databases, APIs, and utilities.
- ✓ **Agents** – Autonomous systems that reason, plan, and collaborate dynamically.

Since these interactions are fundamentally different, two distinct protocols have emerged to streamline interoperability:

- ◆ **MCP (Model Context Protocol)** – Optimized for connecting AI agents to external tools and structured data sources.
- ◆ **A2A (Agent-to-Agent Protocol)** – Designed to facilitate communication and collaboration between AI agents.

# 1. 🚀 Why Protocols



# 1. Why Protocols



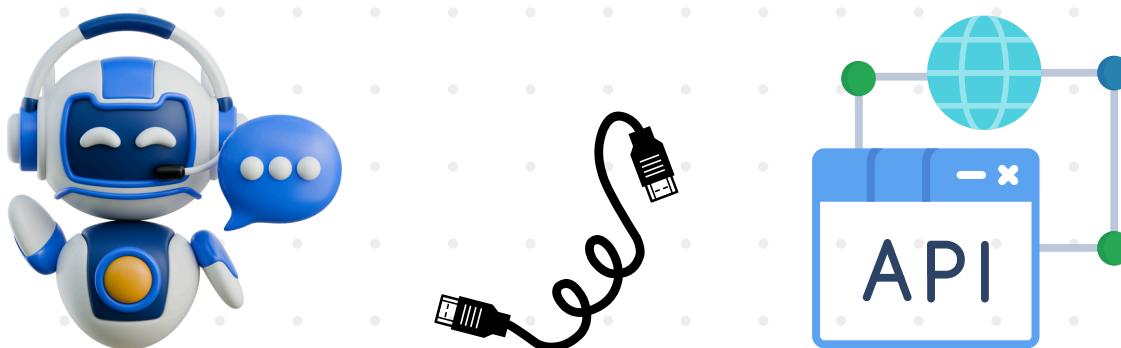
## Why Does This Matter?

- ◆ **MCP helps agents:**
  - Access tools, APIs, and structured data
  - Execute predictable, one-shot tasks with clear inputs and outputs
  - Think: “Translate this text” or “Query this database”
- ◆ **A2A enables agents to:**
  - Collaborate with other autonomous agents
  - Share goals, plans, and context across tasks
  - Navigate complex, multi-step workflows together
  - Think: multiple agents solving a research task or coordinating customer support

## 2. About MCP

**The Model Context Protocol (MCP)** is an open standard for connecting AI models to tools, APIs, and structured data sources — in a consistent, secure, and composable way.

- 🔧 Think of MCP as a universal connector between agents and tools like:
  - APIs (e.g., weather, payment, language translation)
  - Internal company systems (e.g., CRM, inventory databases)
  - Utilities (e.g., calculators, PDF parsers, code interpreters)



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## 2. About MCP

 **This enables models** to reason over which tool to use, call it reliably, and incorporate the result into their output – whether it's search, calculations, translations, or beyond.

### Who introduced it?

- Anthropic, the AI research company behind Claude.
- They published it as an open standard, meaning any developer, company, or platform can adopt and implement it.

### Why was it introduced?

- AI models like Claude, GPT, and others are increasingly expected to use external tools (e.g., APIs, calculators, search engines).
- Before MCP, there was no universal way to describe these tools in a format models could understand and use reliably.

# 2. MCP Architecture

At its core, MCP follows a lightweight **client-server architecture** to connect agents (like Claude) to tools and data – both local and remote.

## **Host Application**

Programs like Claude Desktop, IDEs, or custom AI apps that want to access tools/data via MCP.

## **MCP Client**

Each host runs an MCP client – a connector that manages 1:1 sessions with various servers.

## **MCP Servers**

Mini-servers that expose specific tools or data (e.g., filesystem, web API, database) using the standard MCP schema.

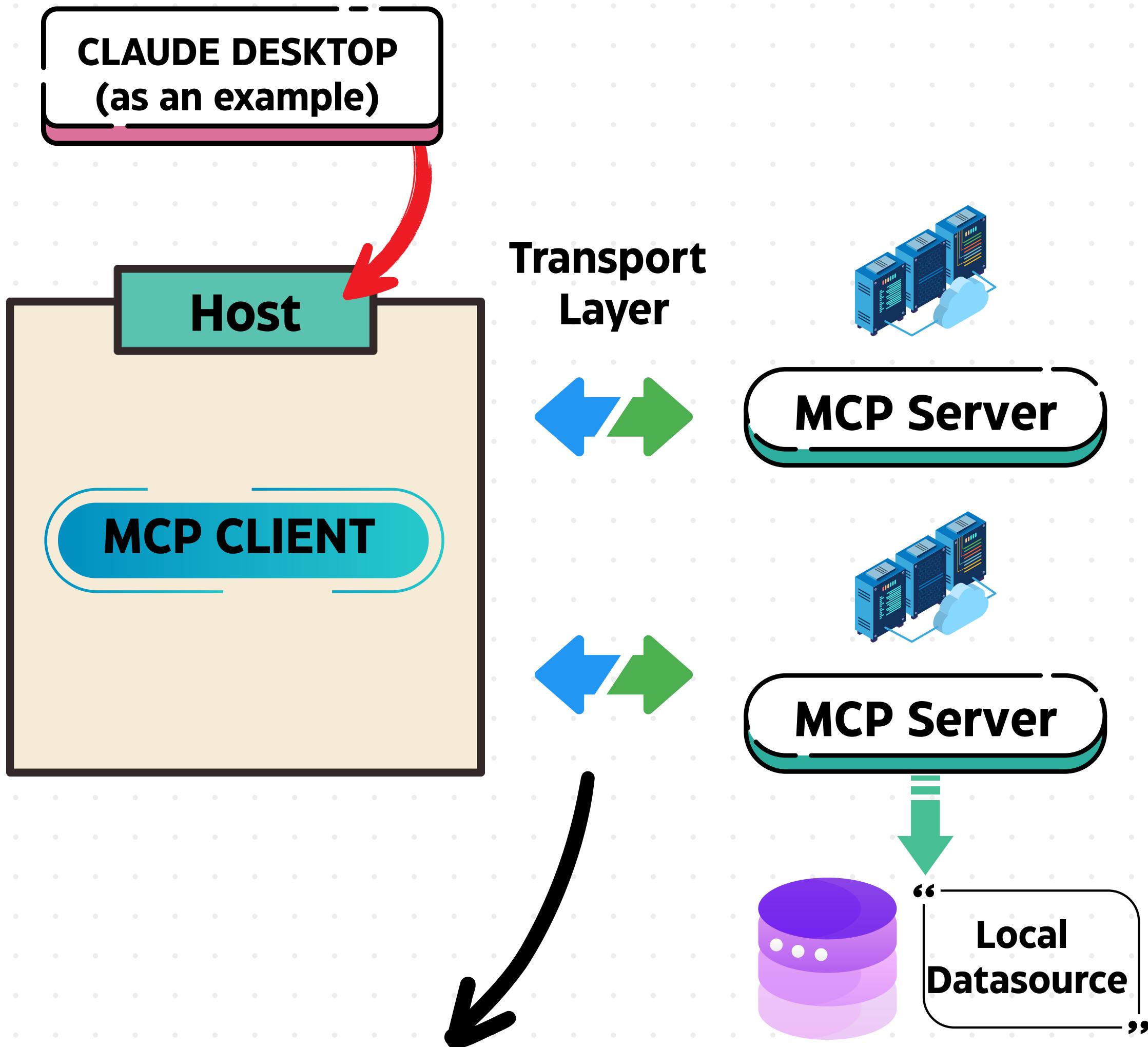
## **Local Data Sources**

Files, folders, or internal databases on your machine – securely accessed by MCP servers.

## **Remote Services**

External APIs (e.g., weather, calendars, vector DBs) that MCP servers can also expose.

### 3. MCP Architecture



The transport layer handles the actual communication between clients and servers.

# 4. About A2A

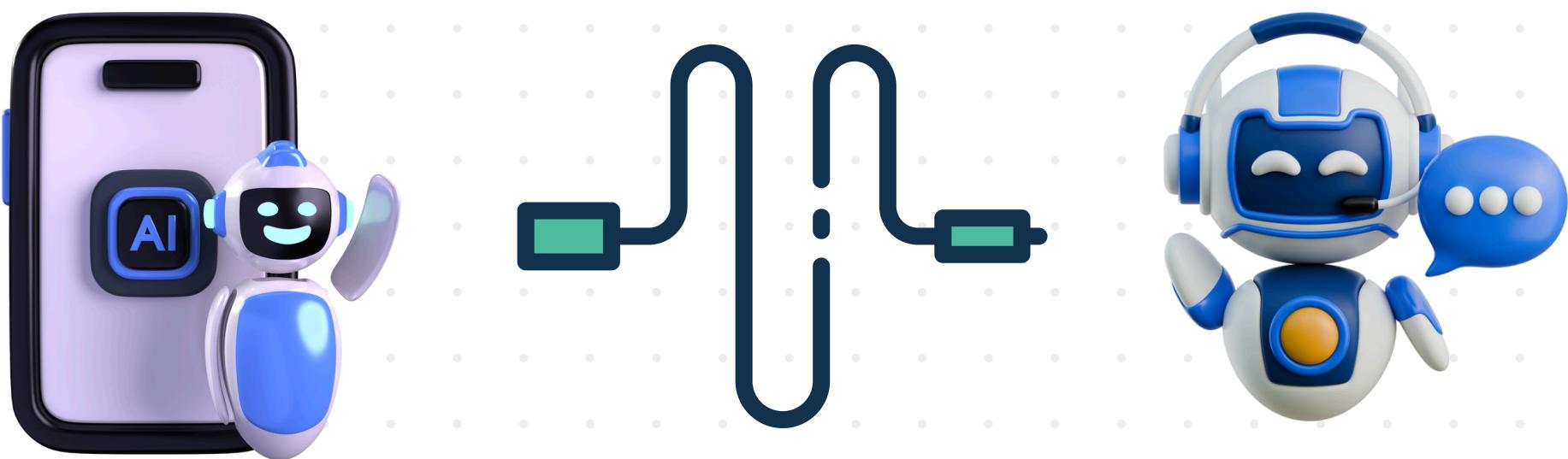


**A2A (Agent-to-Agent Protocol)** is designed (announced on April 9, 2025 by Google) to enable AI agents to collaborate directly with one another – across teams, companies, and platforms. While MCP connects agents to tools, A2A connects agents to each other.



**Think of A2A as:**

A shared language and protocol that lets agents introduce themselves, negotiate roles, exchange plans, and collaborate autonomously, all without needing a human in the loop.



# 4. About A2A



## What A2A Enables

- **Inter-Agent Communication:** Allows AI agents to discover, negotiate, and collaborate with one another, regardless of their underlying systems .
- **Workflow Automation:** Facilitates complex, multi-agent workflows, such as coordinating tasks between customer support, billing, and logistics agents .
- **Dynamic Capability Discovery:** Enables agents to dynamically discover and utilize the capabilities of other agents in real-time .



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# 5. Key Concepts in A2A

A2A defines how AI agents communicate and collaborate through a common set of actors, data structures, and interaction patterns.

## ◆ Core Actors

- **User:** The human or service who triggers a goal or task that needs agent assistance.
- **A2A Client** (Client Agent): Acts on behalf of the user, sending requests to remote agents.
- **A2A Server** (Remote Agent): Receives requests, performs work, and returns results.



# 5. Key Concepts in A2A

## Typical Workflow

### 1 User Initiates a Task

A human or automated service triggers a request—for example, asking an AI assistant to plan a trip.

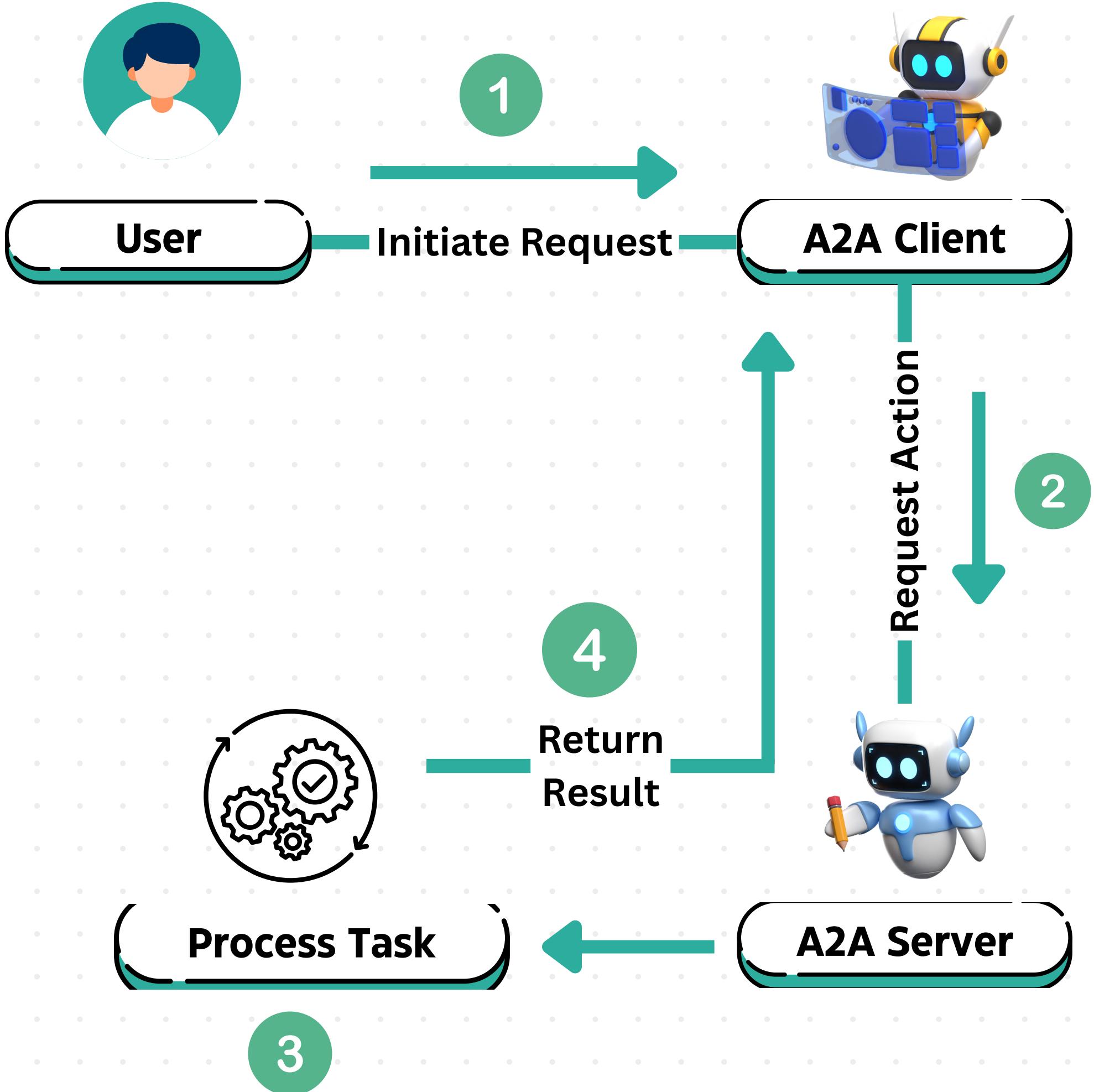
### 2 A2A Client (Client Agent)

Processes the Request The AI assistant analyzes the request and determines that multiple specialized agents are needed (e.g., booking flights, hotels, activities). It then sends structured requests to remote agents.

### 3 A2A Server (Remote Agents)

Receive the Request Each remote AI agent interprets the request, processes it, and returns data (e.g., available flights, prices).

# 5. Key Concepts in A2A



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# 5. Key Concepts in A2A

## ◆ Fundamental Elements of A2A

 **Agent Card** – A JSON metadata file that defines an A2A Server’s identity, capabilities, endpoints, and authentication methods. ◆ Think of it like an AI agent’s profile page—it tells other agents what it can do and how to interact with it.

 **Task** – A unique, stateful unit of work (e.g., “generate report”). ◆ Just like a work order at a company, it tracks progress through stages: submitted → working → completed → failed.

 **Message** – The core communication unit within a Task.

◆ Similar to emails in a project, it carries instructions, context, or responses exchanged between agents.

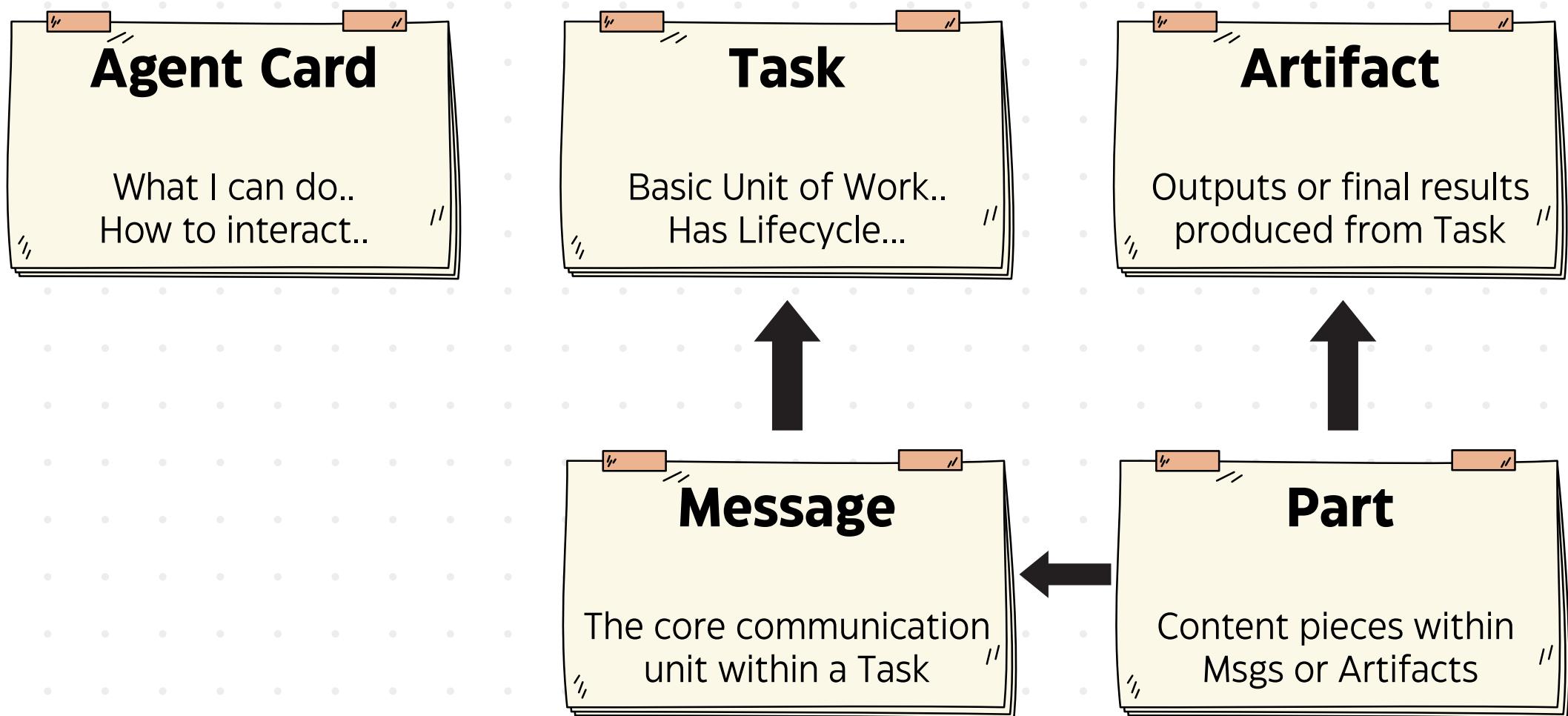
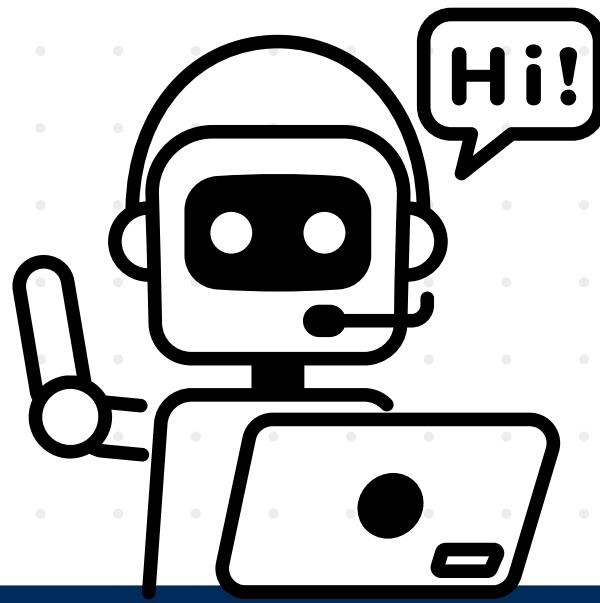
 **Part** – Content pieces inside Messages or Artifacts (text, files, structured data).

◆ Think of it as an email attachment—supporting the main message with extra details.

 **Artifact** – Outputs generated by agents—documents, images, or data files.

◆ Like a final report in a business project, it’s the completed deliverable often streamed incrementally for real-time updates.

# 5. Key Concepts in A2A



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# 6. How MCP & A2A Work Together

## ✓ **MCP (Model Context Protocol)** →

Connects AI agents to structured tools & external resources

## ✓ **A2A (Agent-to-Agent Protocol)** →

Enables AI agents from different providers to collaborate & exchange information

## ⚙️ Why Two Protocols?

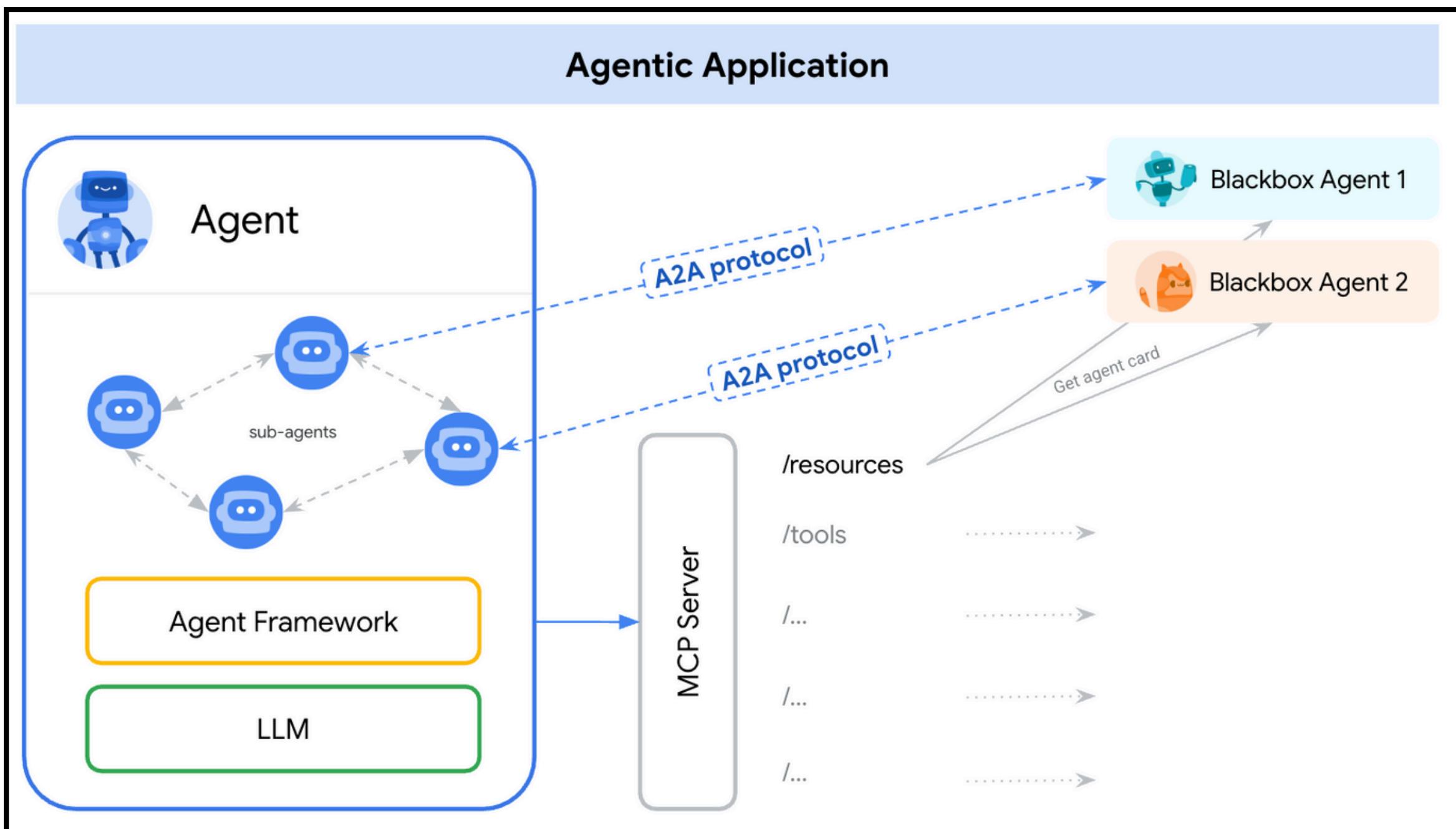
### 🔧 MCP → AI Agents Using Tools

- ◆ Connects agents to structured APIs, databases & predefined functions
- ◆ Works best for single request-response interactions

### 🤝 A2A → AI Agents Collaborating

- ◆ Standardizes communication between independent, opaque AI agents
- ◆ Allows for multi-step workflows, task delegation & negotiation

# 6. How MCP & A2A Work Together



## Source

*An agent-driven system can leverage A2A for seamless communication between AI agents, while each agent relies on MCP to efficiently access and operate its specialized tools and resources.*

# 6. How MCP & A2A Work Together: Example

## 1 A Disaster Strikes

A major earthquake has hit a city, and aid organizations need immediate coordination to assess damage and send help.

## 2 A Human or Organization Makes a Request (A2A Starts Here)

A rescue coordinator contacts an AI Disaster Response Manager:

“We need to assess damage and organize emergency medical support.”

## 3 The Disaster Response AI Takes Action

The AI Disaster Response Manager realizes it needs multiple specialized AI agents to help:

- ✓ Damage Assessment AI – To analyze destruction levels.
- ✓ Medical Logistics AI – To coordinate supplies and emergency teams.
- ✓ Transport AI – To optimize delivery routes.

These agents all communicate with each other using A2A, sharing real-time updates.

# 6. How MCP & A2A Work Together: Example

## 4 AI Agents Request Tools & Data (MCP Starts Here)

Each agent uses MCP to connect with external tools and retrieve key information:

- ✓ Damage Assessment AI → Requests satellite images to assess impact.
- ✓ Medical Logistics AI → Checks medical supply availability in nearby warehouses.
- ✓ Transport AI → Finds the fastest, safest delivery routes for aid trucks.

## 5 AI Agents Share Updates & Coordinate Responses (A2A in Action Again)

- ✓ The Damage Assessment AI sends an update: “Severe damage detected in Zones A & B—hospitals impacted.”
- ✓ The Medical Logistics AI responds: “Deploying supplies to affected hospitals. Need transport clearance.”
- ✓ The Transport AI confirms: “Routes optimized—aid trucks are moving now.”

## 6 The Response Plan is Finalized

- 💬 The AI Disaster Response Manager reports back to the rescue coordinator:
  - ✓ “Damage has been assessed. Supplies are on the way. Volunteers are being dispatched.”

# 7. Key Takeaways

- ✓ A2A enables AI agents to collaborate, share context, and coordinate tasks across different providers.
- ✓ MCP ensures AI agents can access tools & structured data, making interactions efficient and standardized.
- ✓ Together, they create a scalable AI ecosystem, allowing seamless collaboration and smart tool usage.
- ✓ Enhances interoperability, ensuring AI systems work across platforms without custom integrations.
- ✓ Balances structured & dynamic interactions, with MCP handling precise tool calls and A2A supporting flexible collaboration.



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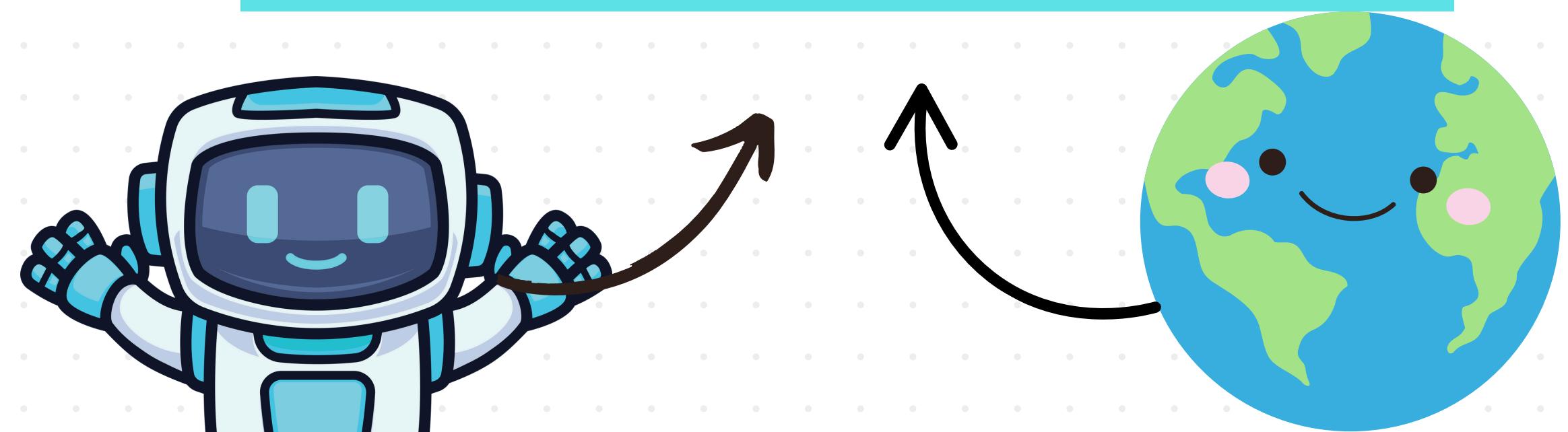
# 8. Ethical AI: Building a Transparent & Inclusive Future

🔧 AI & ML are powerful tools—but their impact depends on how we use them.

💡 Transparency, fairness, and accountability must be at the heart of every AI-driven solution. Technology should empower, not harm, and ensure inclusivity rather than bias.

🌐 The key is in our hands. By prioritising ethical decision-making, we can build AI systems that enhance lives, foster trust, and contribute to a better world for all of humanity.

🔍 Join the AI movement that's making powerful language models accessible to everyone for more inclusive and better world.



# Are you AI enthusiast as well? 🚀

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