AI Agents

Getting Useful Results from AI Reasoning

Welcome

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  - Biological modeling
  - Composable/CloudFit
  - Gradient Momentum
- Today
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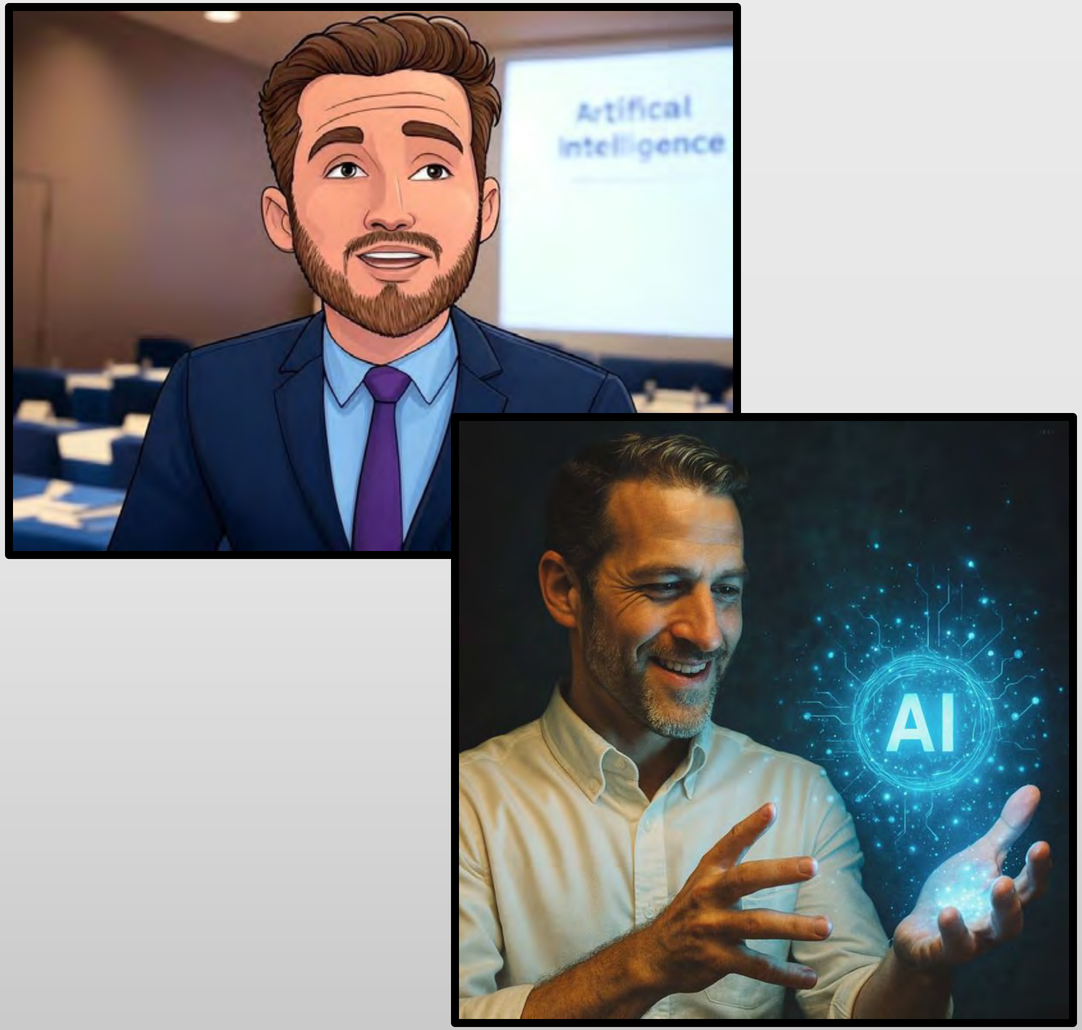
  - Experience



What is an Agent

“Asking an LLM to do something and giving it the tools to make it happen.” – Jeremy

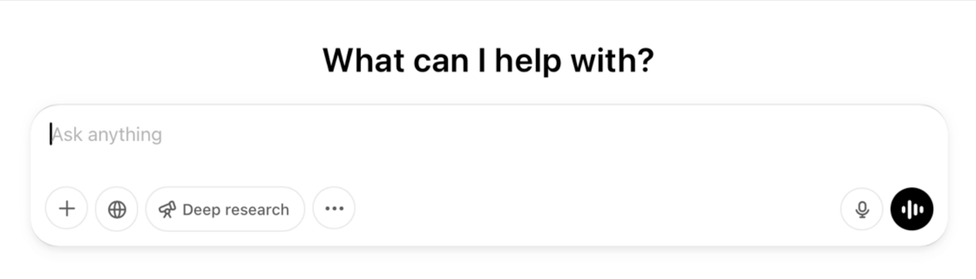
“An application that attempts to achieve a goal by observing the world and action upon it using the tools that it has at its disposal” – Google

“Applications where LLM outputs control the workflow” – Hugging Face

“Systems where LLMs dynamically direct their own processes and tool usage, maintaining control over how they accomplish tasks” – Anthropic

Building Blocks

- Prompt engineering is critical
- Importance of structure
- Importance of constraints



What can I help with?

User Input

Previous Conversation

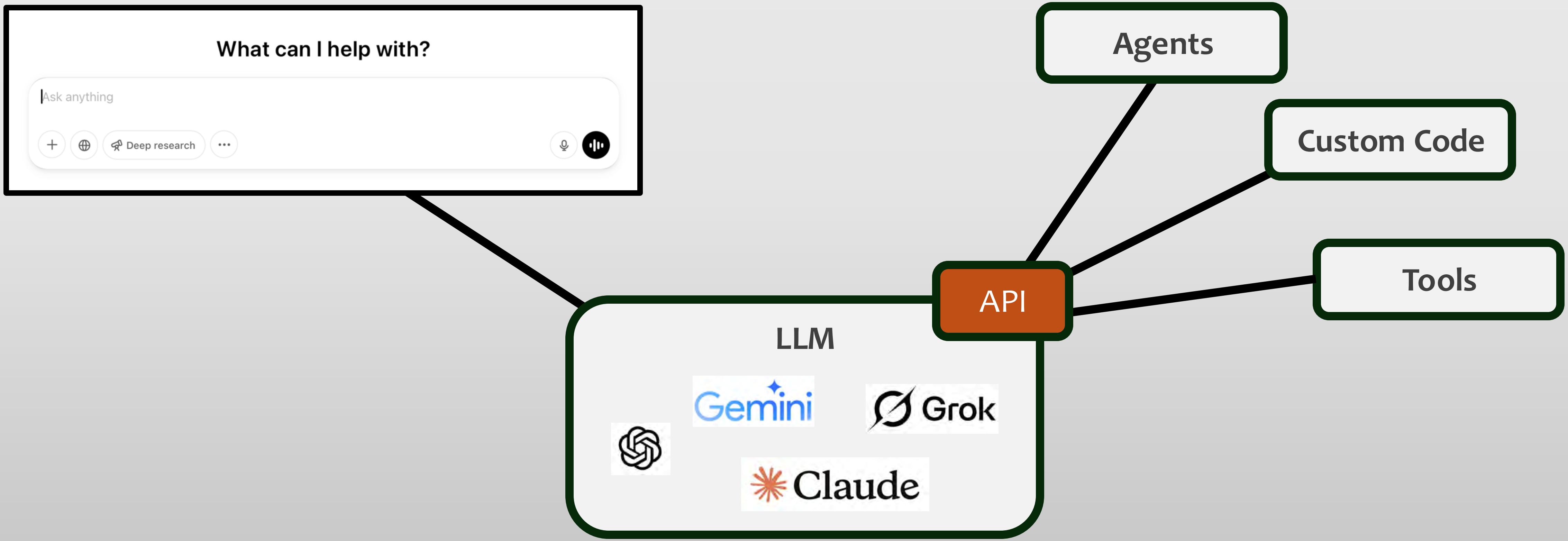
External Data

System Prompt

Demo

Structure and Constraints

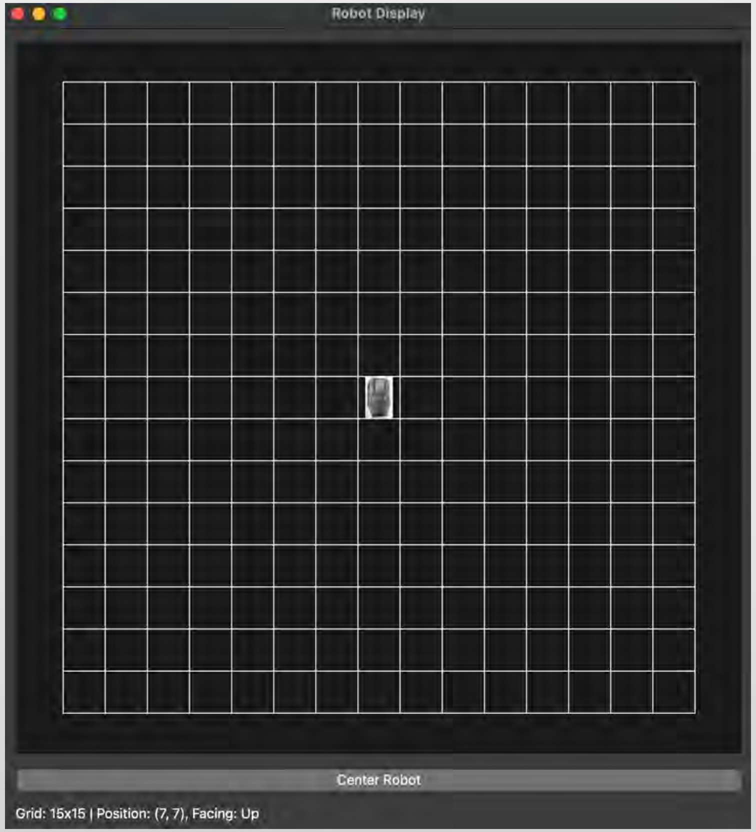
GPT as an API



What can I help with?

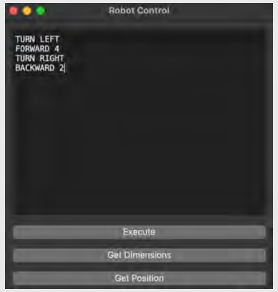
Demo

Structure and API Integration

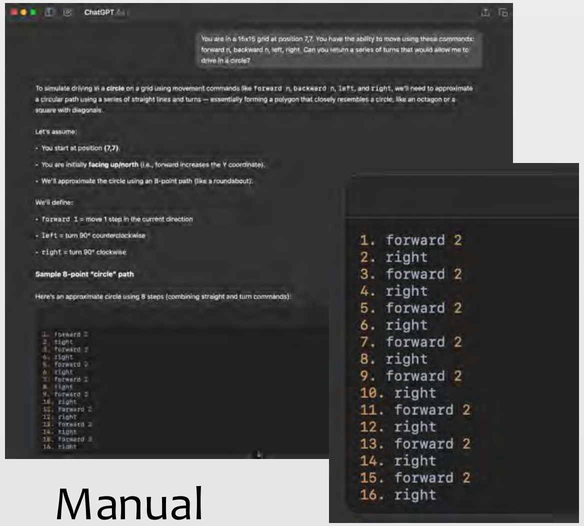


Grid: 15x15 | Position: (7, 7), Facing: Up

Manual Controller



```
TURN LEFT
FORWARD 4
TURN RIGHT
BACKWARD 2
```



You are in a 15x15 grid at position 7,7. You have the ability to move using these commands: forward n, backward n, left, right. Can you return a series of turns that would allow me to drive in a circle?

To simulate driving in a **circle** on a grid using movement commands like `forward n`, `backward n`, `left`, and `right`, we'll need to approximate a circular path using a series of straight lines and turns — essentially forming a polygon that closely resembles a circle, like an octagon or a square with diagonals.

Let's assume:

- You start at position **(7,7)**.
- You are initially **facing up/north** (i.e., forward increases the Y coordinate).
- We'll approximate the circle using an 8-point path (like a roundabout).

We'll define:

- `forward 1` = move 1 step in the current direction
- `left` = turn 90° counterclockwise
- `right` = turn 90° clockwise

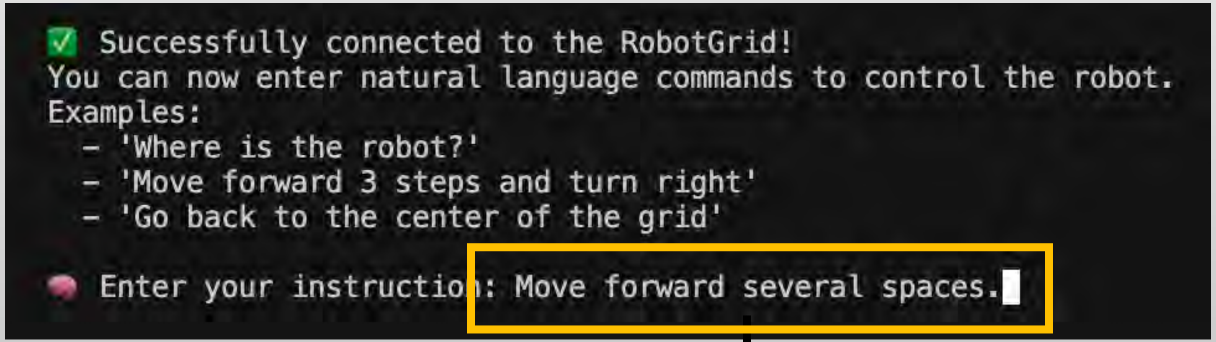
Sample 8-point "circle" path

Here's an approximate circle using 8 steps (combining straight and turn commands):

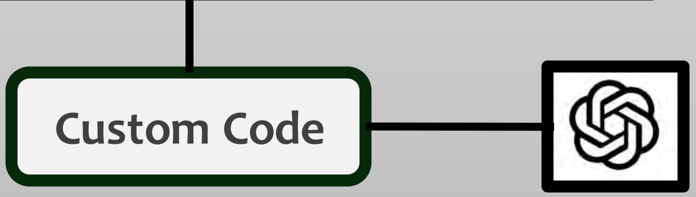
```
1. forward 2
2. right
3. forward 2
4. right
5. forward 2
6. right
7. forward 2
8. right
9. forward 2
10. right
11. forward 2
12. right
13. forward 2
14. right
15. forward 2
16. right
```

Manual Prompting

LLM Controller



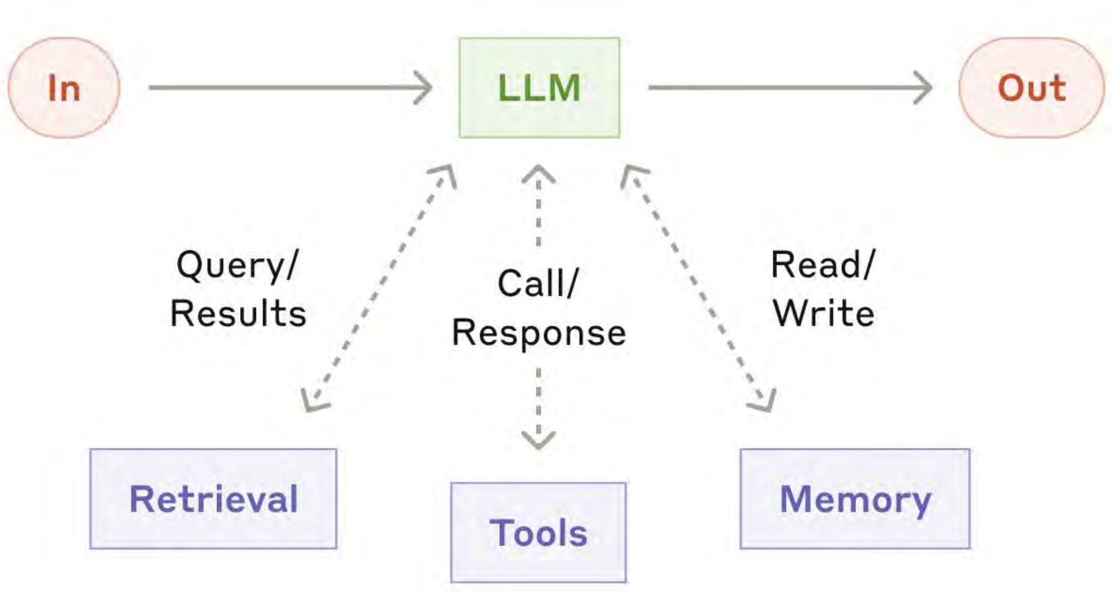
```
✅ Successfully connected to the RobotGrid!
You can now enter natural language commands to control the robot.
Examples:
  - 'Where is the robot?'
  - 'Move forward 3 steps and turn right'
  - 'Go back to the center of the grid'

🧠 Enter your instruction: Move forward several spaces.
```



Custom Code

What structure allows us to do

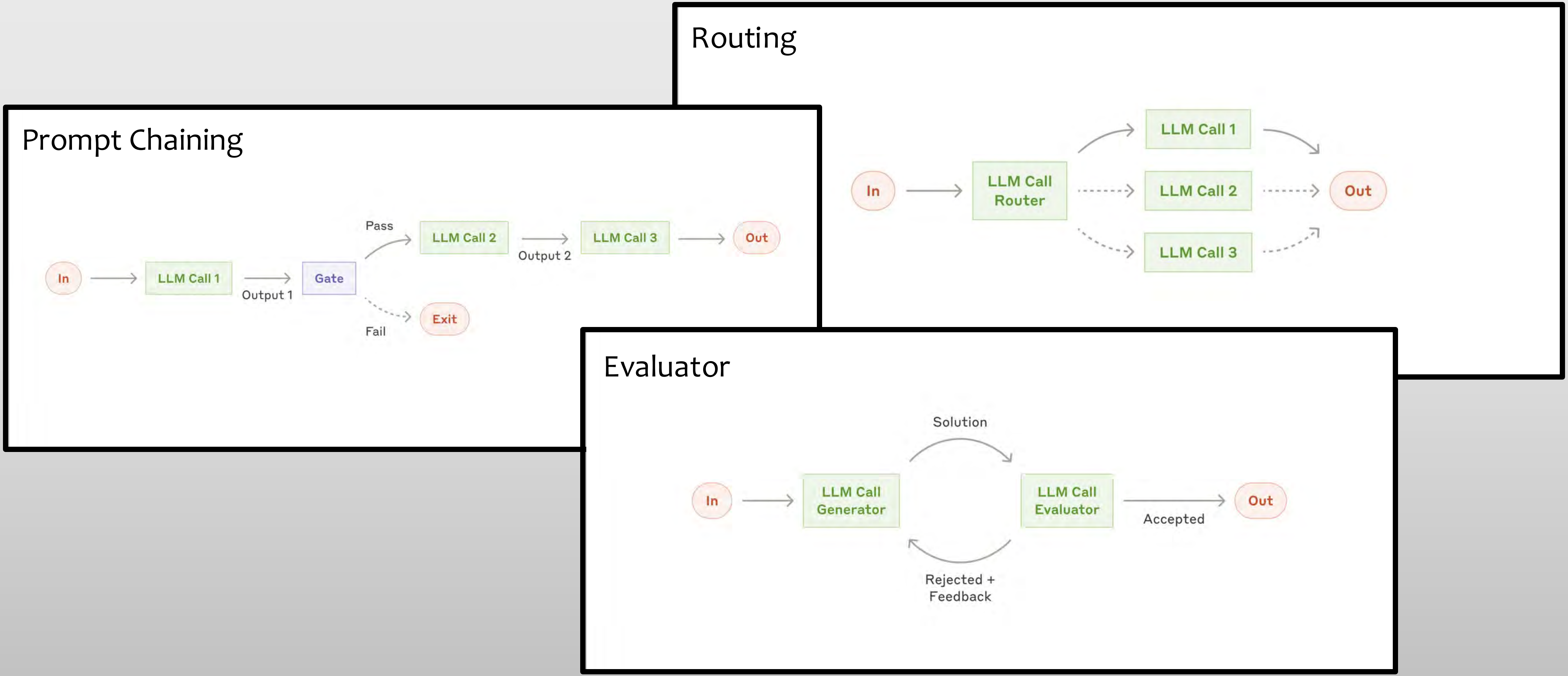
What is an Agent?



https://www.anthropic.com/engineering/building-effective-agents

AI Workflows

Prompt Chaining, Routing, Evaluator

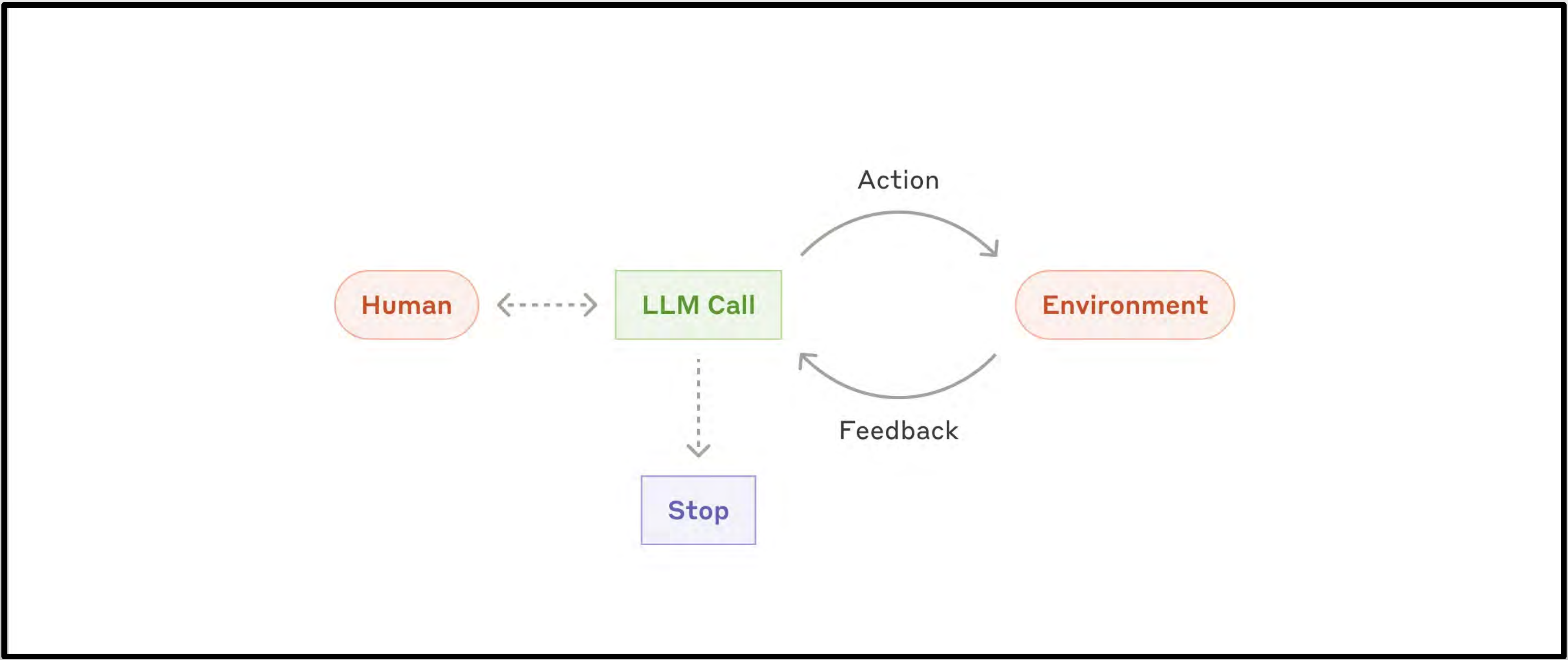


Prompt Chaining

Routing

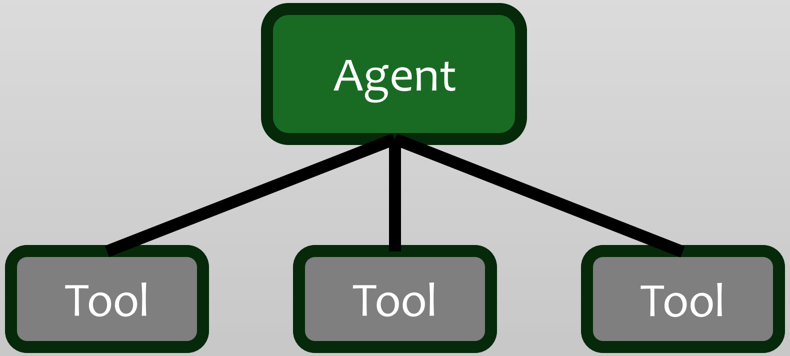
Evaluator

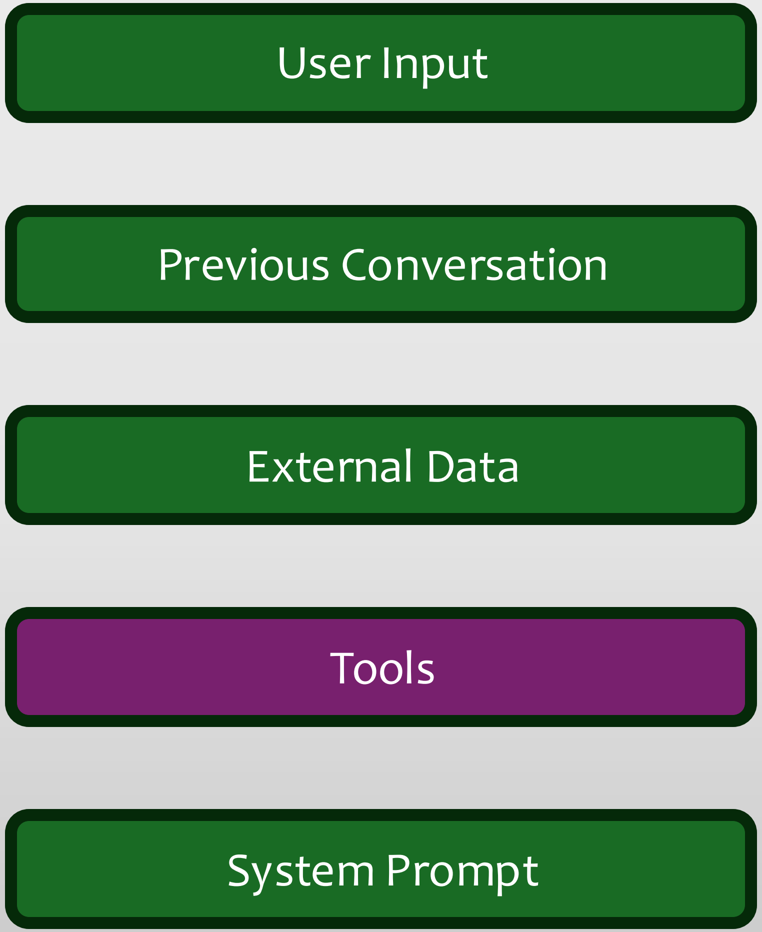
Agents



Tools

- Extends usefulness of an LLM/user interaction
- LLM has knowledge about available tools and how to use them
- Not a new concept




User Input

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Tools

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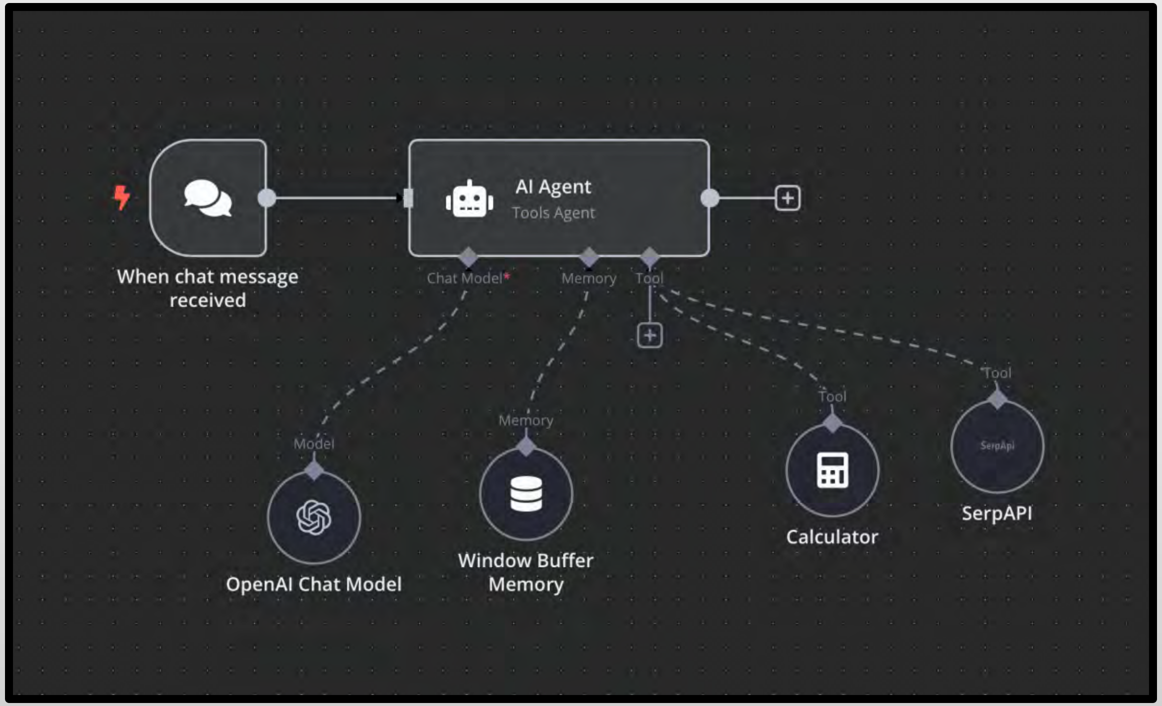
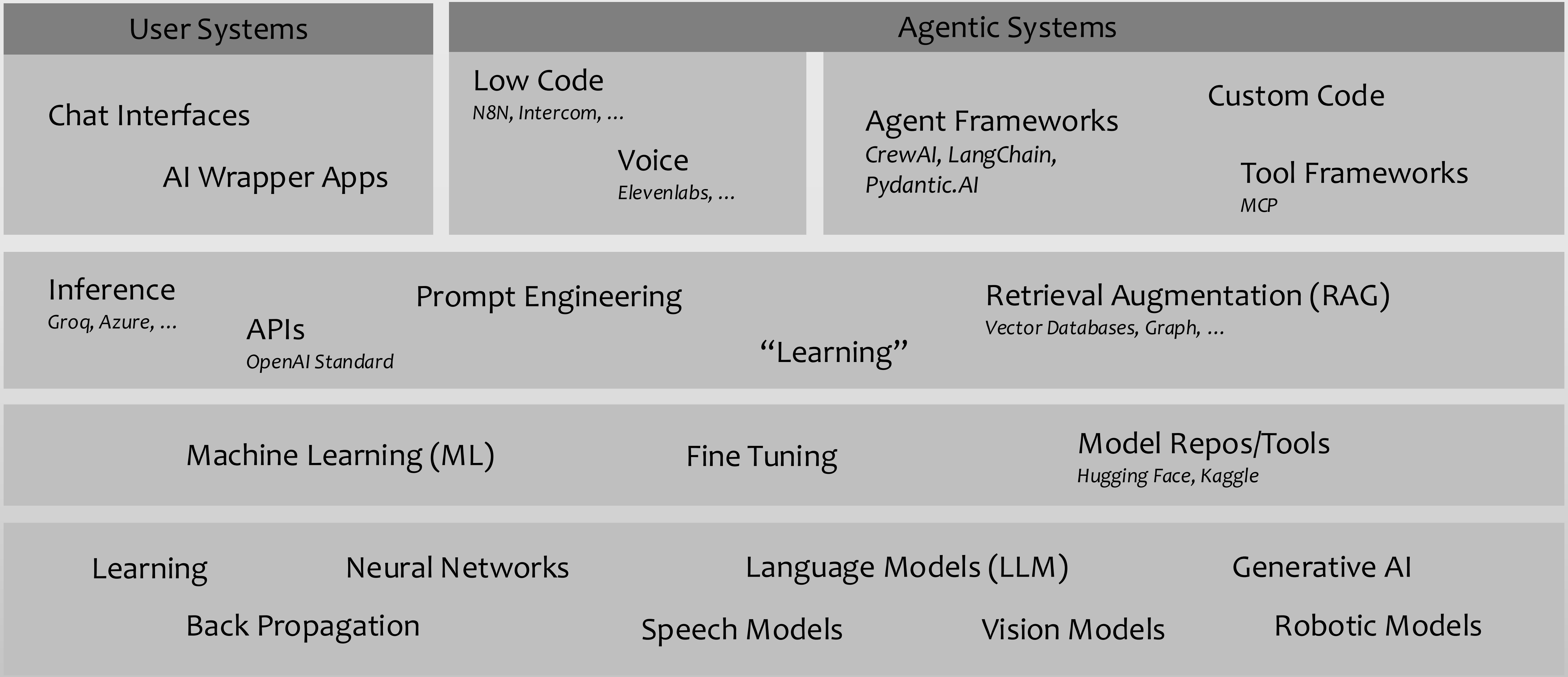
Demo

Low code agents with N8N



Layers and Terms



User Systems

Chat Interfaces

AI Wrapper Apps

Agentic Systems

Low Code
N8N, Intercom, …

Voice
Elevenlabs, …

Agent Frameworks
CrewAI, LangChain,
Pydantic.AI

Custom Code

Tool Frameworks
MCP

Inference
Groq, Azure, …

APIs
OpenAI Standard

Prompt Engineering

"Learning"

Retrieval Augmentation (RAG)
Vector Databases, Graph, …

Machine Learning (ML)

Fine Tuning

Model Repos/Tools
Hugging Face, Kaggle

Learning

Neural Networks

Language Models (LLM)

Generative AI

Back Propagation

Speech Models

Vision Models

Robotic Models

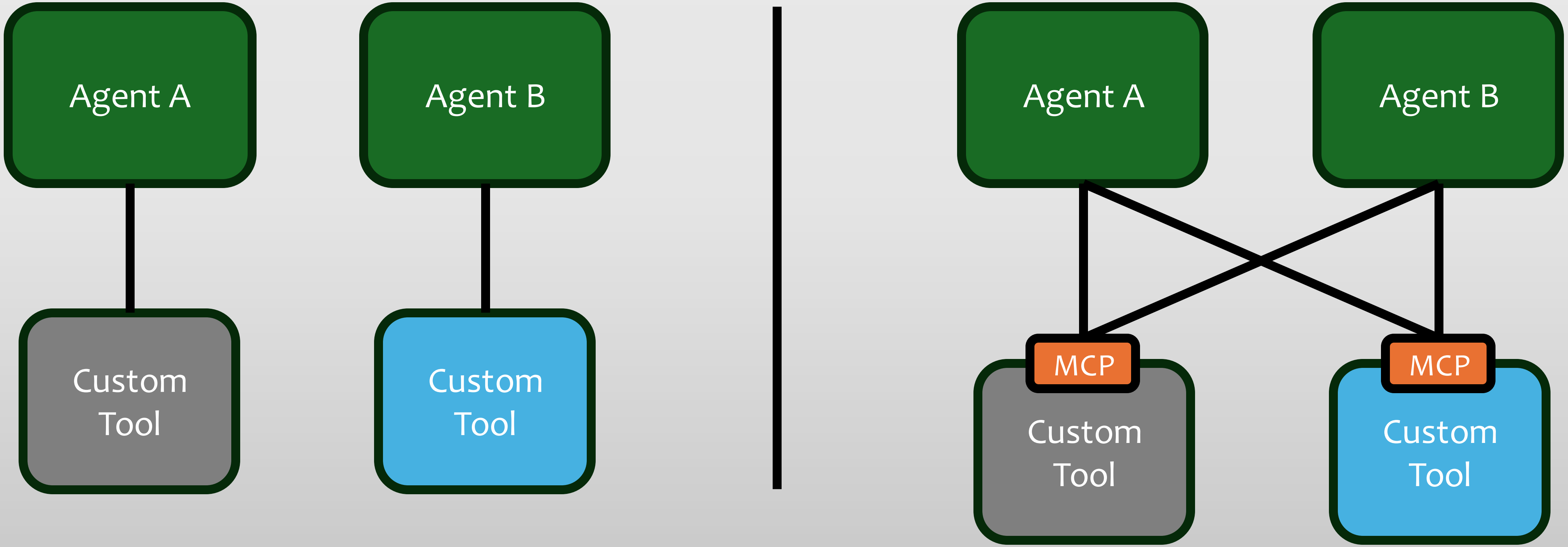
Common Tool Language: MCP

- Model Context Protocol
- A standard for agent-to-tool communication
- Self-describing
- Growing support

“Think of MCP like a USB-C port for AI applications.” - Anthropic

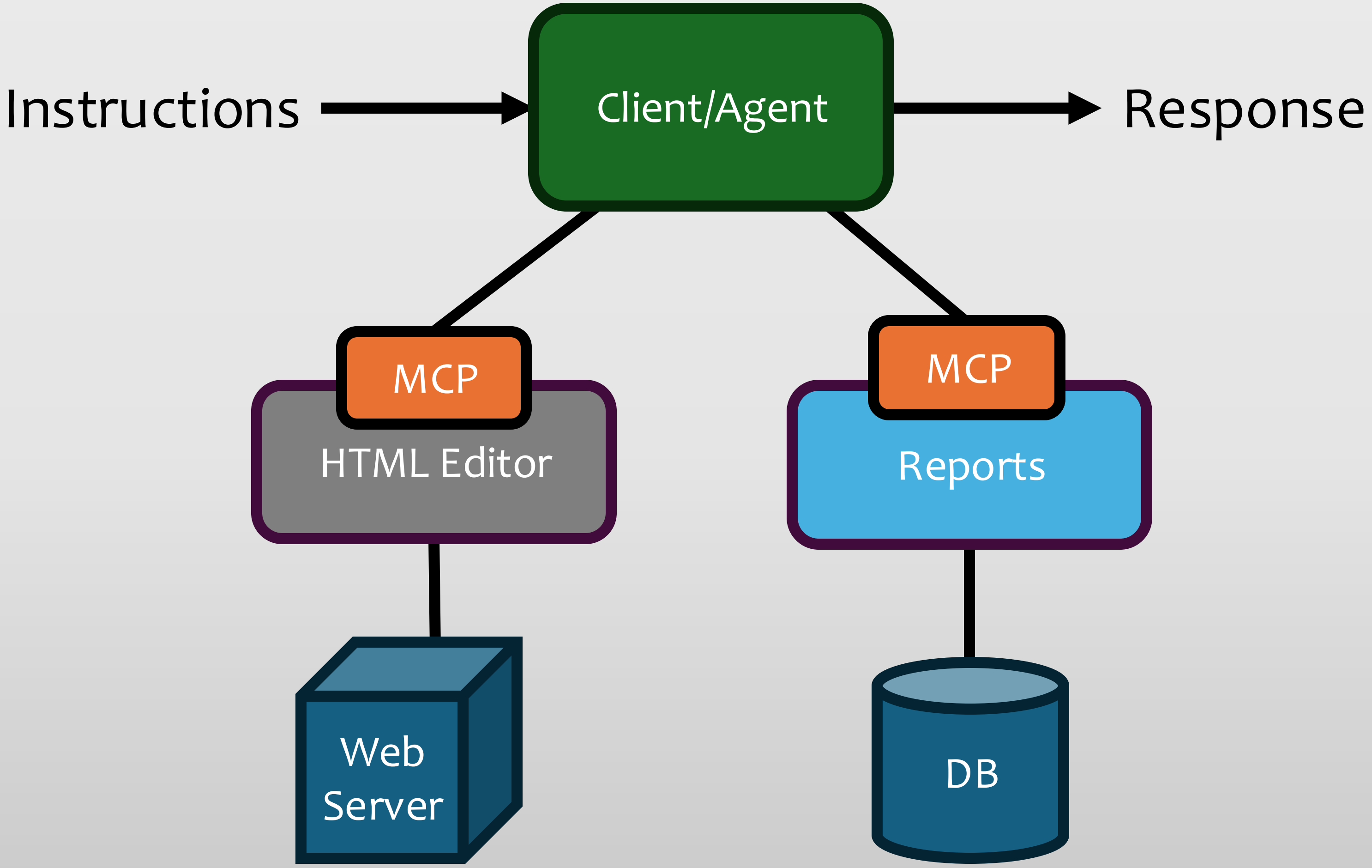
https://modelcontextprotocol.io

Common Tool Language: MCP



Demo

HTML and Report Data



Things I’ve Learned

- No code solutions can be a liability – AI speaks text-based code
- Build in pieces, not all at once
- Code generation challenges – endless loops
  - Let me fix that… adds 20 files
  - Changes best practices mid-flight
  - Check-in code often
- Establish rules/boundaries, or else the AI will get creative on you
- Using AI for automated deployments is painful – ever evolving clouds
- There are a lot of distractions
  - Chasing the latest model can be a waste of time
  - Locally hosting LLMs

Thank you

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