

# AI Engineer Essentials Bootcamp

## Building Production-Ready Multi Agentic Voice Systems



Isuru Alagiyawanna | 14 Weeks | Design • Implement • Ship

# Your Instructor: Isuru Alagiyawanna

## (Machine Learning Zuu)



- Head of AI, Veracity Group: Enterprise AI Strategy ✓
- AI Consultant, Sampath Bank: Financial-grade Systems ✓
- Visiting Lecturer, SLIIT: Academic to Industry Bridge ✓



“I don’t teach ‘Hello World’. I teach what happens when ‘Hello World’ breaks in production.”

# Meet Your Cohort - Three Distinct Paths

## The Beginners

Students finding their future



## The Builders

Engineers learning AI architecture



## The Scalers

Scientists mastering microservices



Type your current role & target project in chat!



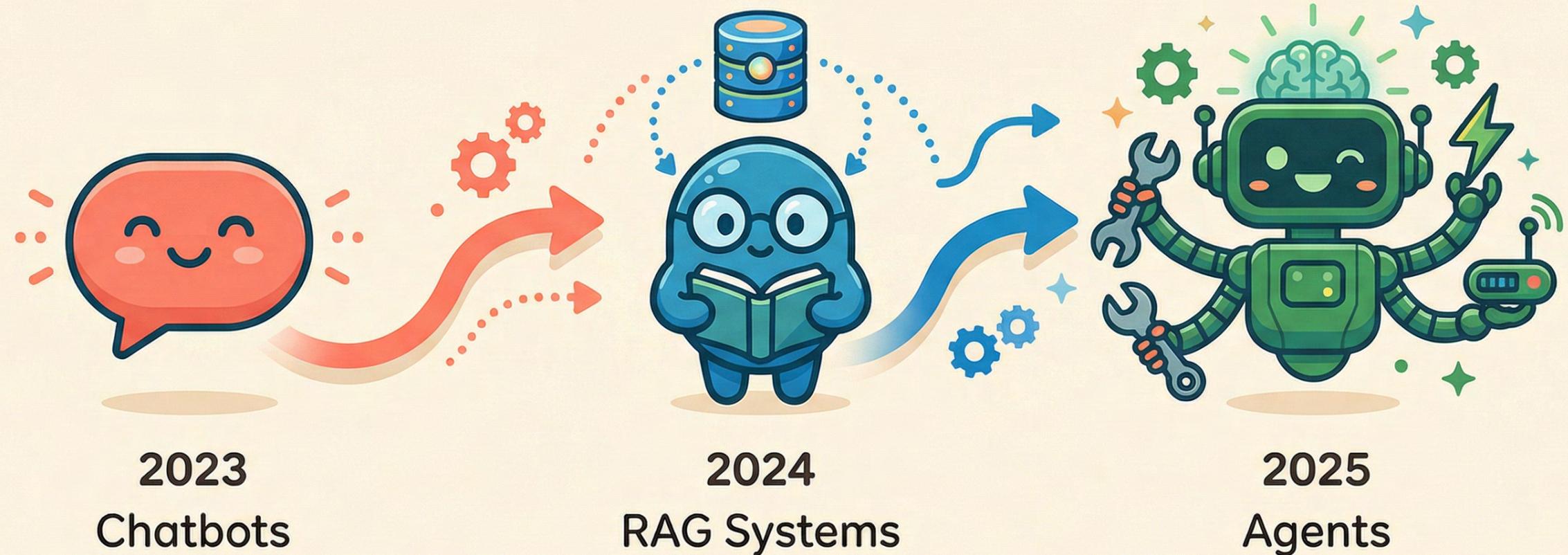
# Our Teaching Philosophy: Production First

- **Production First:** Prioritize reliability over hype
- **Code-Heavy:** Slides are short, VS Code is open
- **Mistakes are Content:** Debugging live failures together
- **"No Black Boxes":** We open the libraries to see the code inside - Understanding beats memorization



# The AI Stack Has Shifted

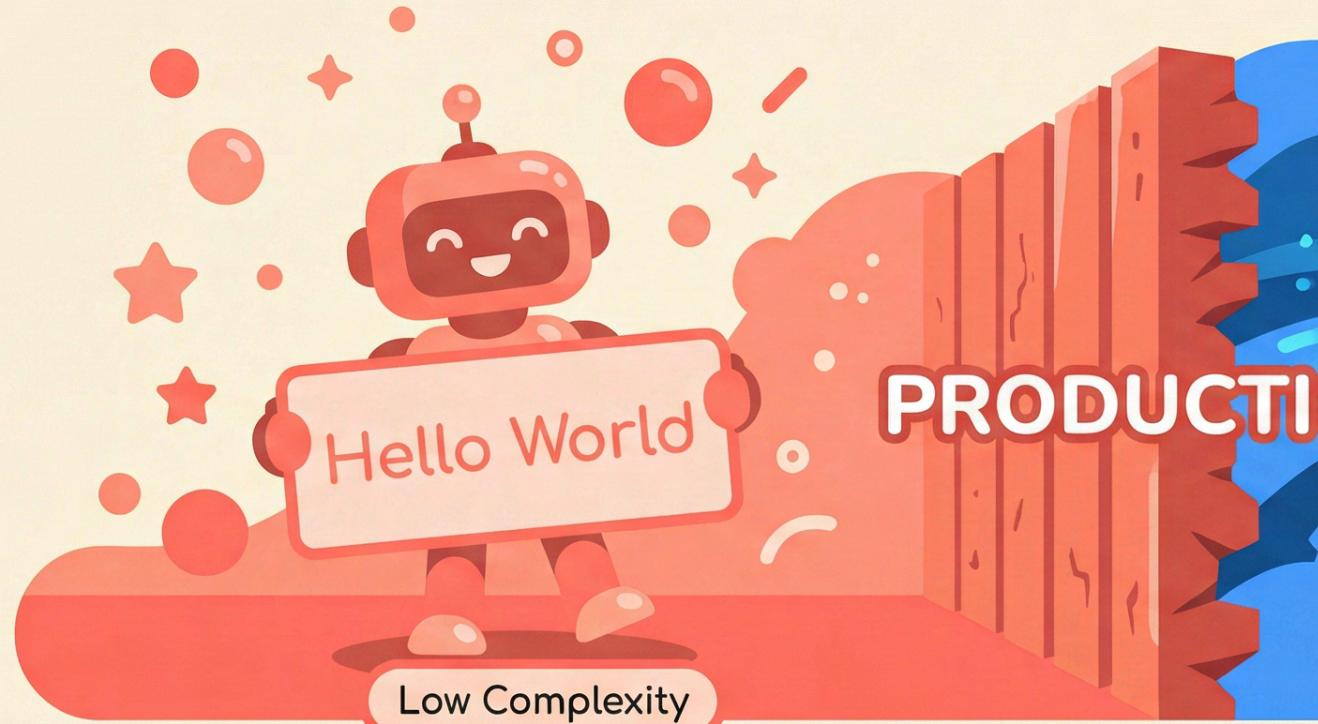
## From Chatbots to Agents - The 2025 Evolution



If you are still building simple RAG, you are already behind.

# The “Hello World” Trap

The “Easy” Part is Over



Demo Land

The Illusion: Writing the code  
is easy.



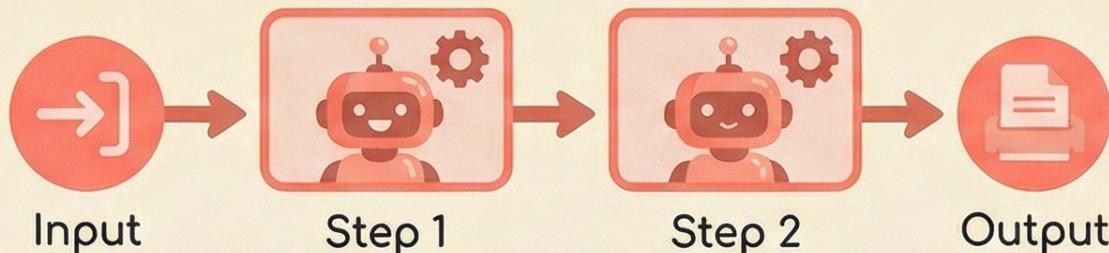
Enterprise Reality

The Reality Gap: Demos don't  
handle Latency, PII, or Scale.

# From Pipelines to Loops

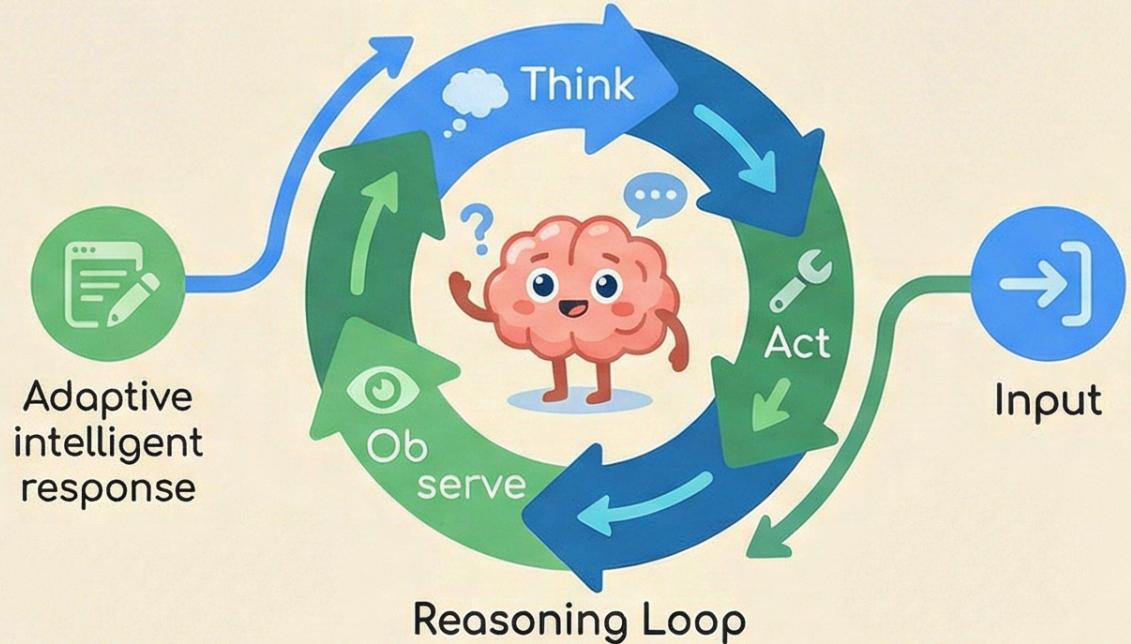
Defining the Agent - Dynamic Reasoning Replaces Rigid Chains

## Rigid Chains



The Old Way: Predictable linear process.

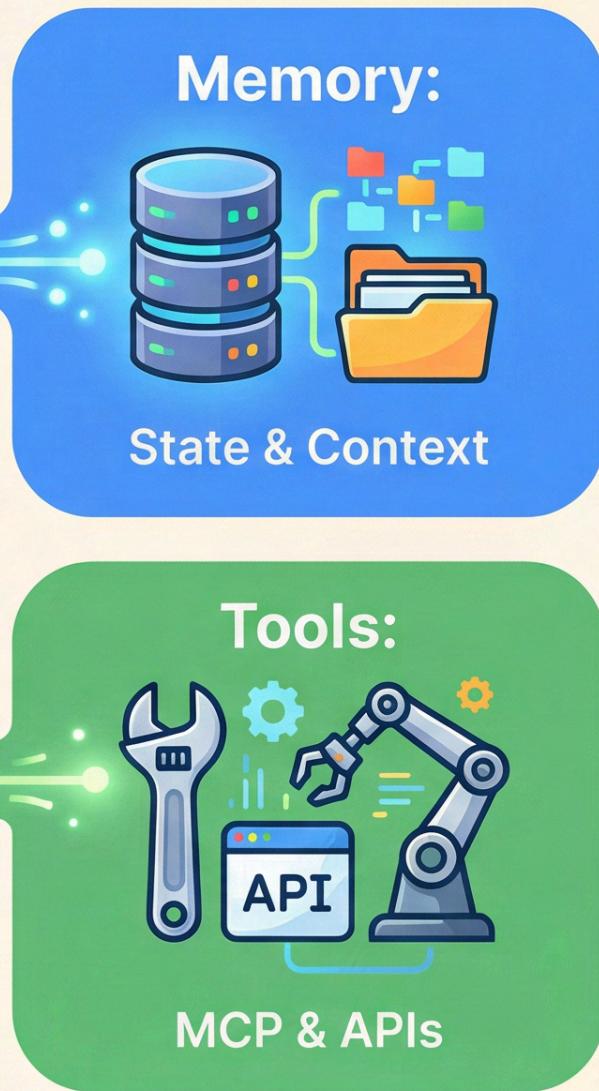
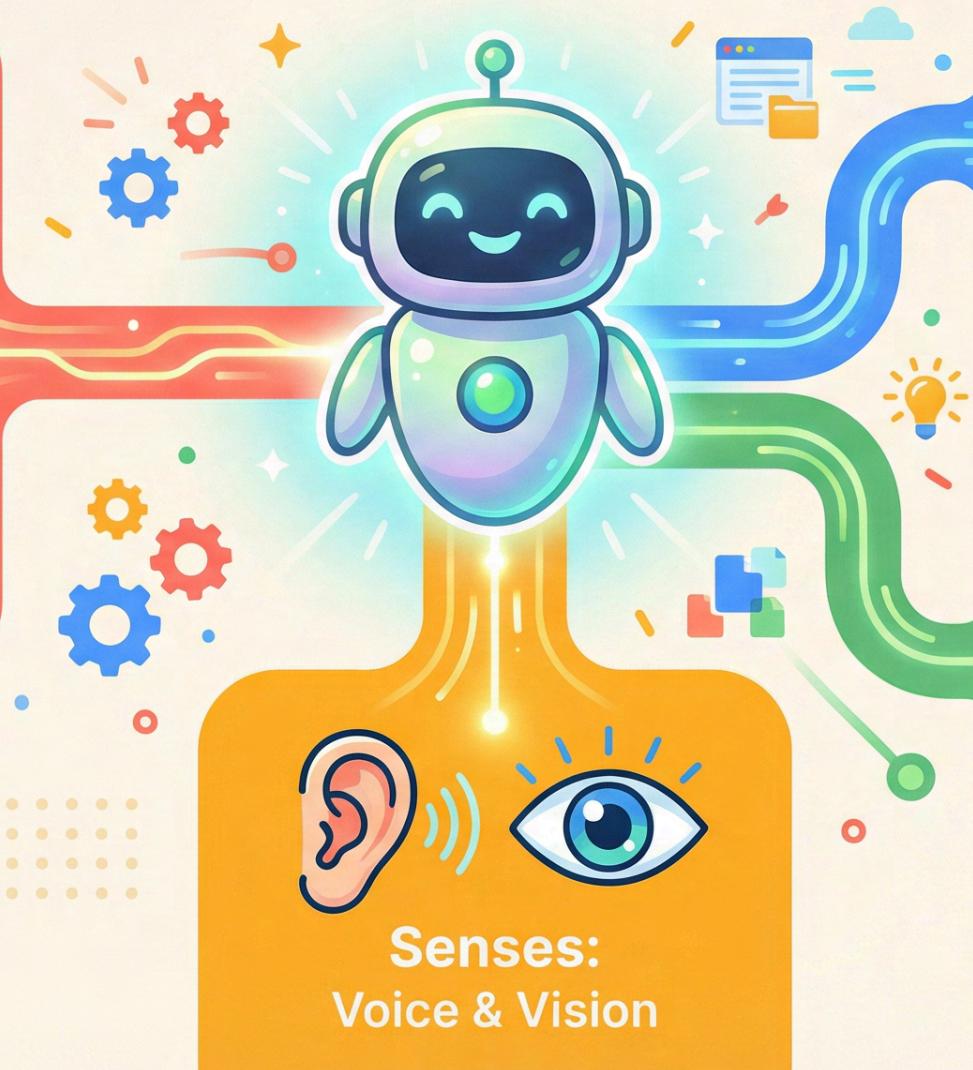
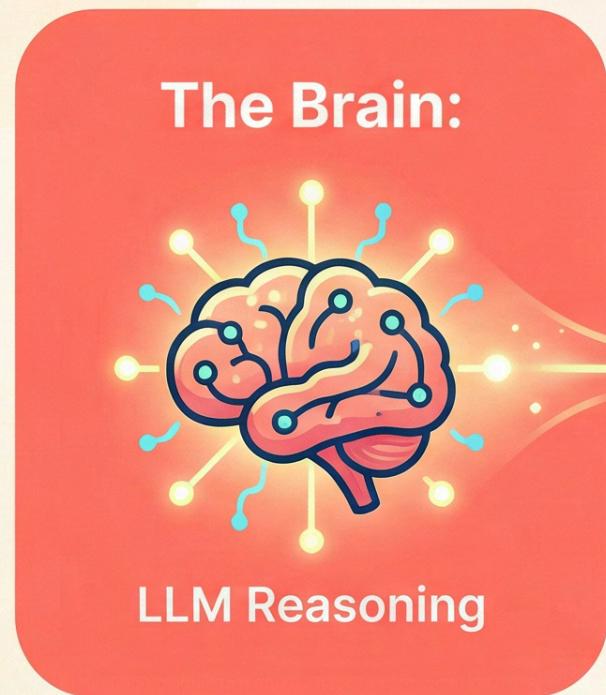
## Dynamic Agents



The New Way: Adaptive reasoning, learning, and action.

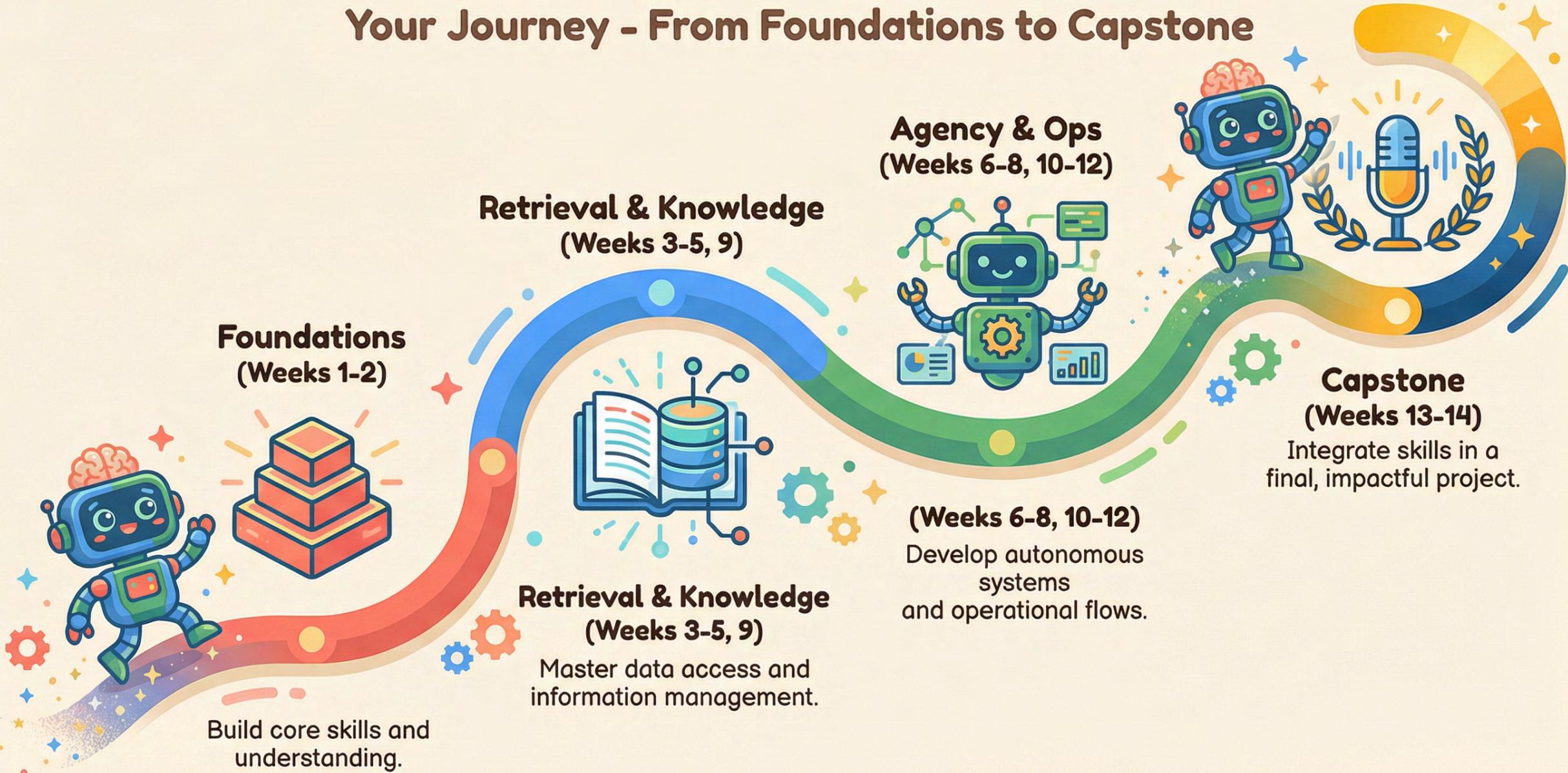
We are moving from rigid chains to dynamic reasoning loops.

# The Anatomy of an Intelligent Agent



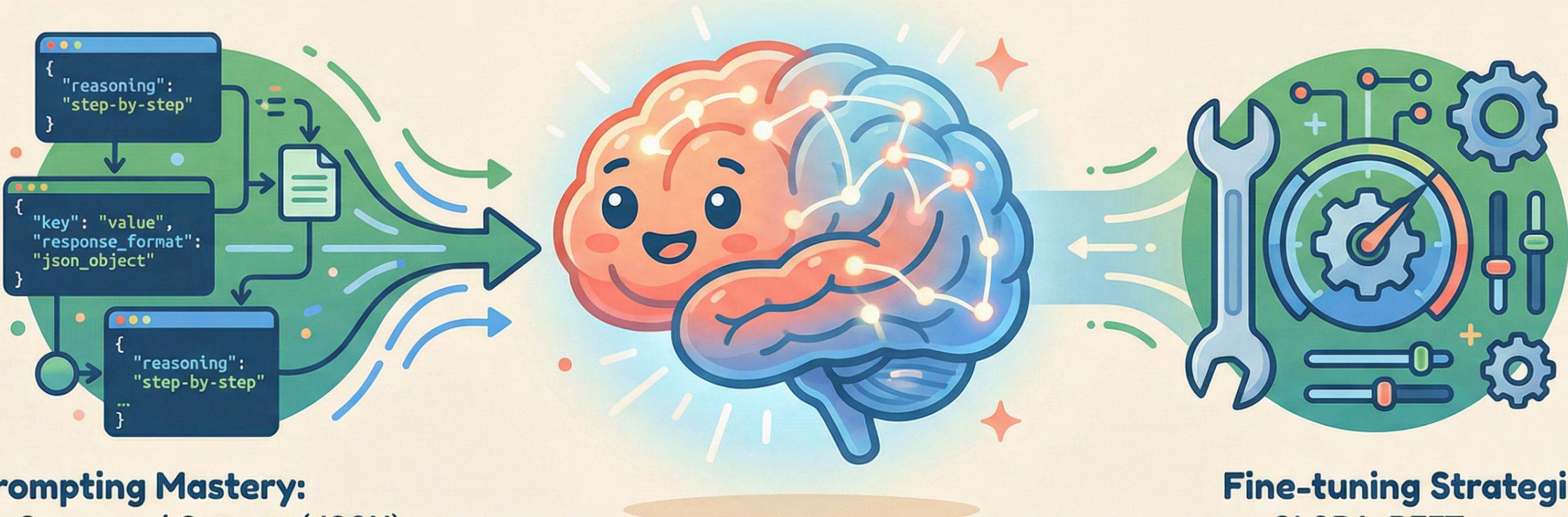
# The 14-Week Arc

## Your Journey - From Foundations to Capstone



# Module I: The Brain

## Prompting & Fine-tuning Essentials (Weeks 1-2)



### Prompting Mastery:

- Structured Outputs (JSON)
- Chain-of-Thought

### The Goal:

"Stop treating the LLM like a magic box."

### Fine-tuning Strategies:

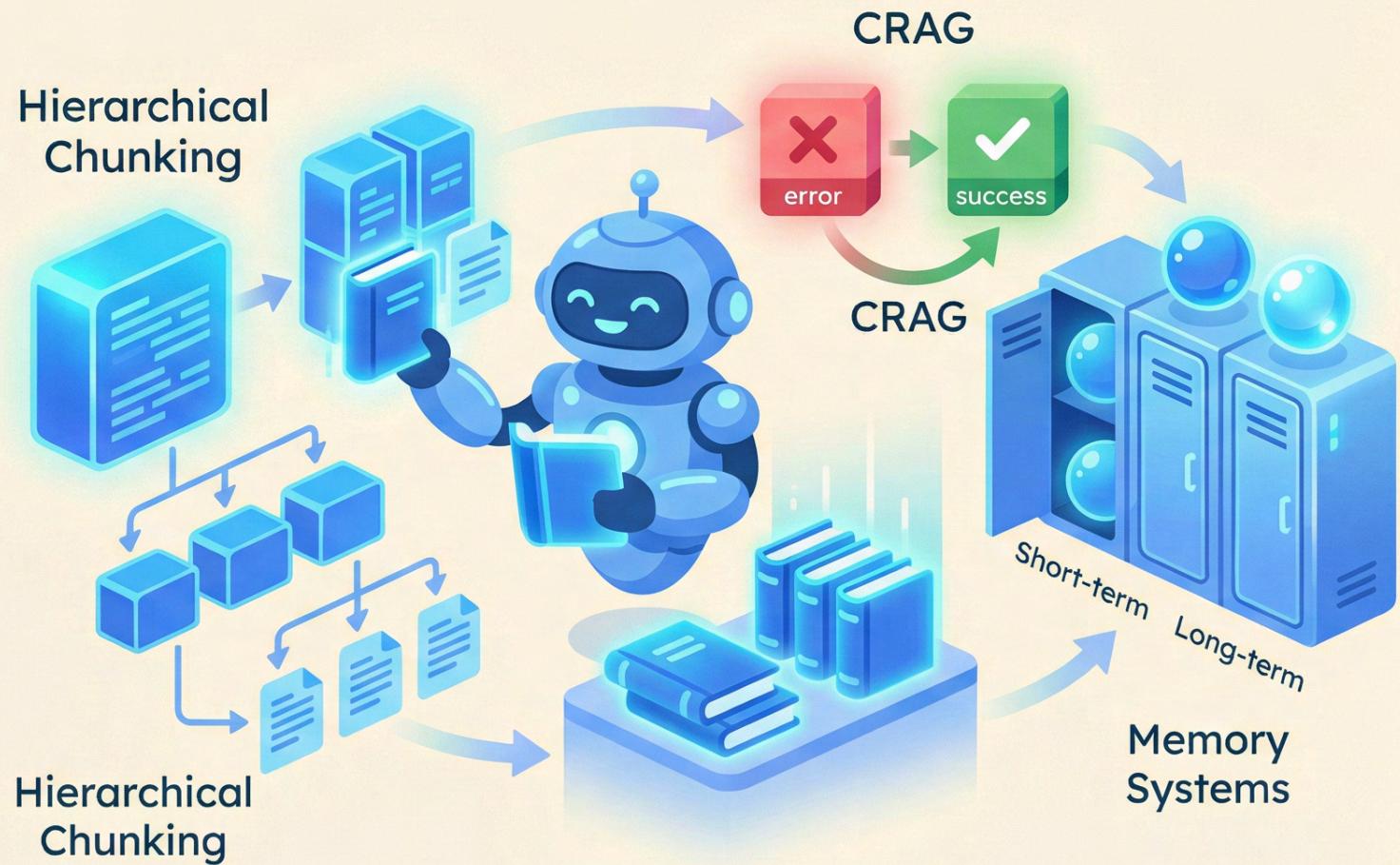
- QLORA, PEFT
- Local Models vs. APIs

# Module II: Knowledge

## Beyond Naive RAG - Building Intelligent Retrieval (Weeks 3-5)

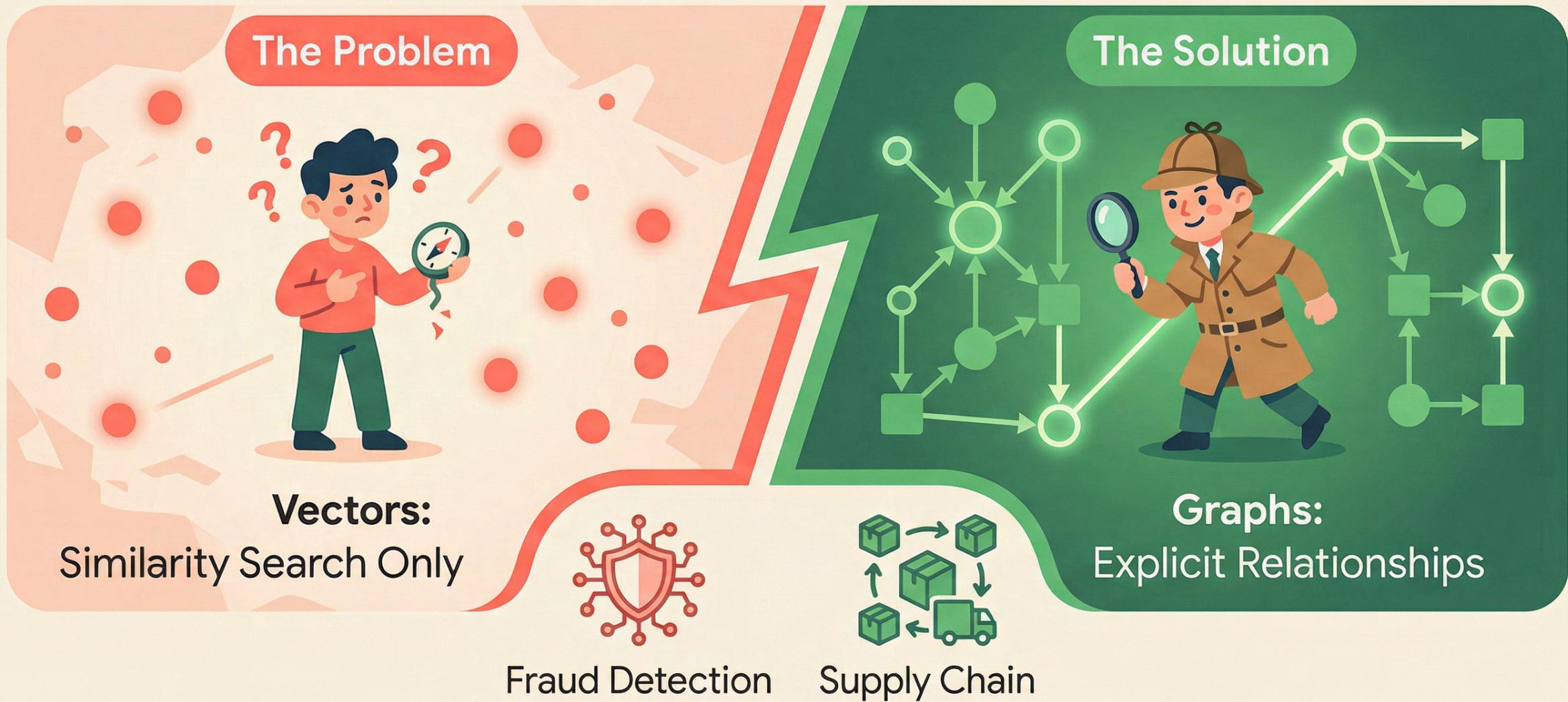
### Key Topics

- **Hierarchical Chunking:** Smart document segmentation
- **Corrective RAG (CRAG):** Self-correcting retrieval errors
- **Memory Systems:** Short-term vs. Long-term storage



# Tech Spotlight: GraphRAG

Why Vectors Aren't Enough - Knowledge Graphs for Complex Reasoning



# Module III: Agentic Design Patterns

## Orchestrating Intelligent Agents (Weeks 7-8)

### Key Topics

- Agent Patterns: ReAct (Reasoning + Acting), Reflection, Planning
- Orchestration: LangGraph & LangChain workflows
- Multi-Agent Systems: Supervisor & Worker patterns



# Tech Spotlight: Model Context Protocol (MCP)

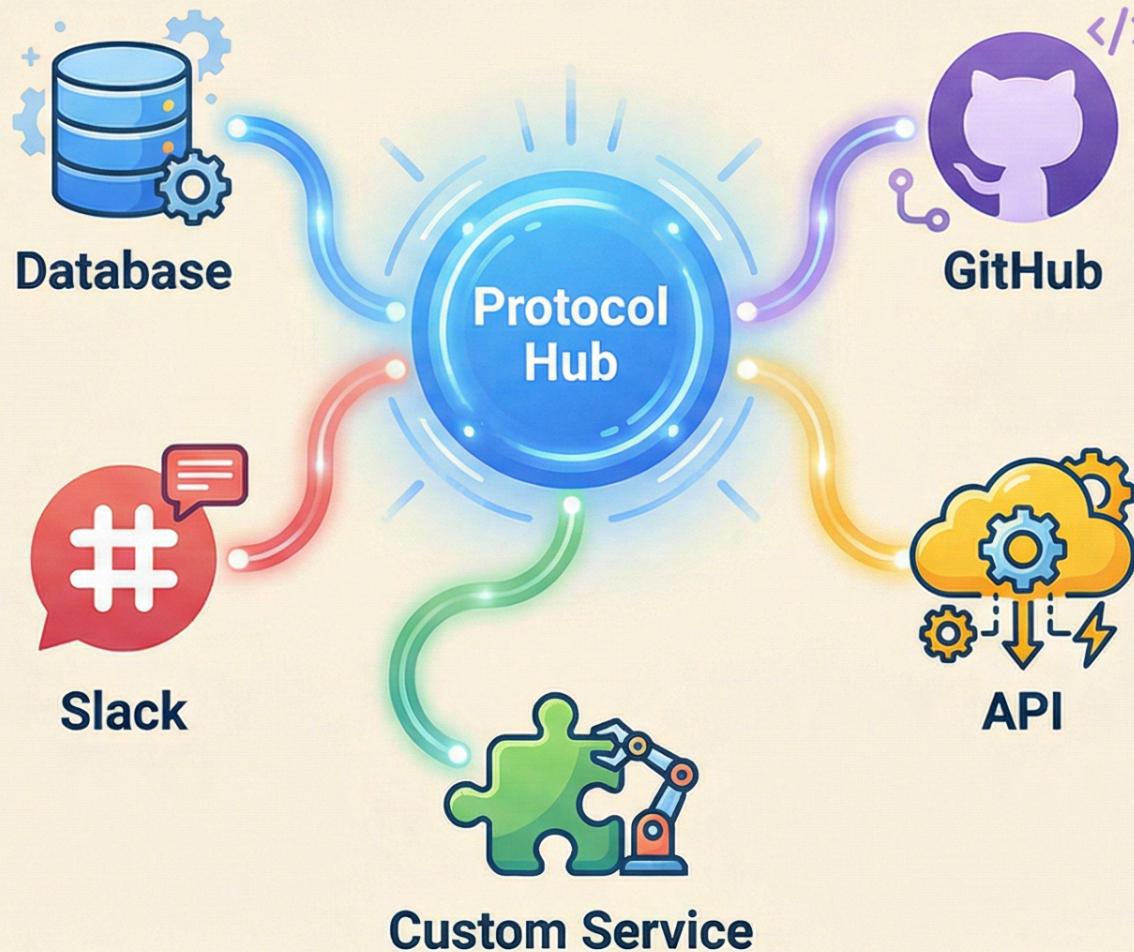
## The Future of AI Tools - Standardized Connections

### What is MCP?

- ✓ An open standard for connecting AI to external systems.

### Why It Matters:

- ✓ Standardizes connections to Databases, Slack, GitHub, and APIs.



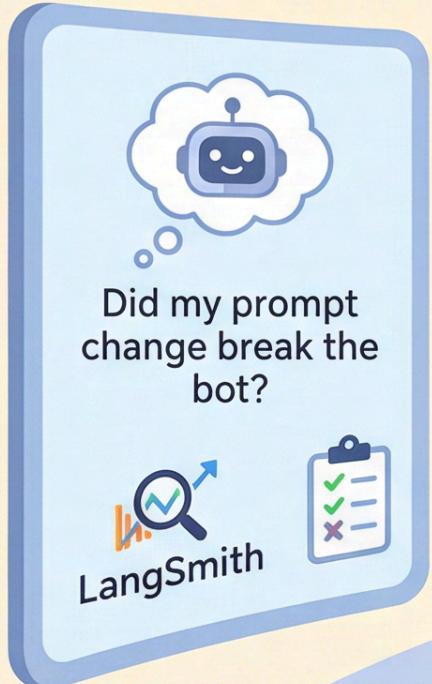
### Your Lab:

- ✓ Build a custom MCP Server connecting to an internal API.

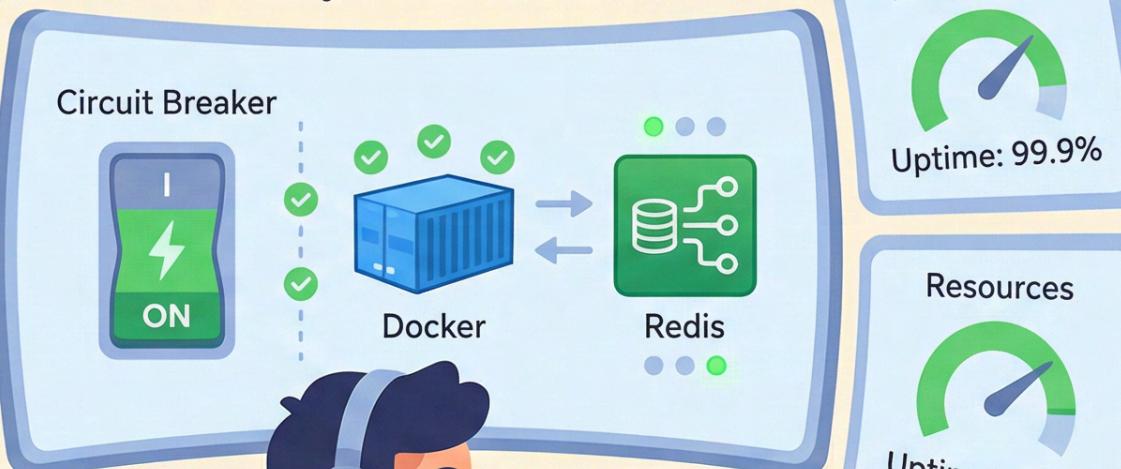
# Module IV: Operations & Observability

From Demos to Production (Weeks 6, 10-11)

## Evaluation Frameworks



## LLMOps Essentials



## Professional Mindset

“Amateurs talk about models. Professionals talk about evaluation sets.”



# The Final Boss: Voice Agent (Weeks 13-14)

## The Capstone Project

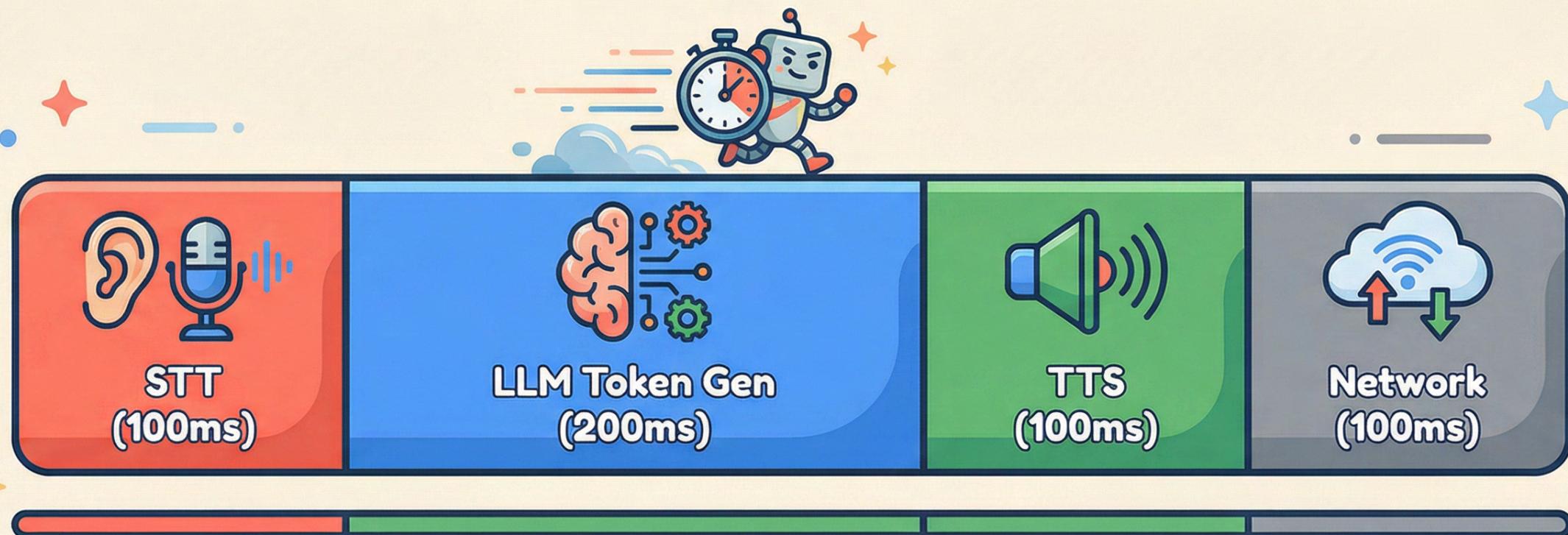
- Building a **Real-Time Voice Agent**
- **Integration:**
  - **STT (Hearing)** LLM
  - **LLM (Thinking)** TTS
  - **TTS (Speaking)**



- **Your Portfolio Piece:** Demonstrate mastery of the entire stack

# Tech Spotlight: The Voice Stack

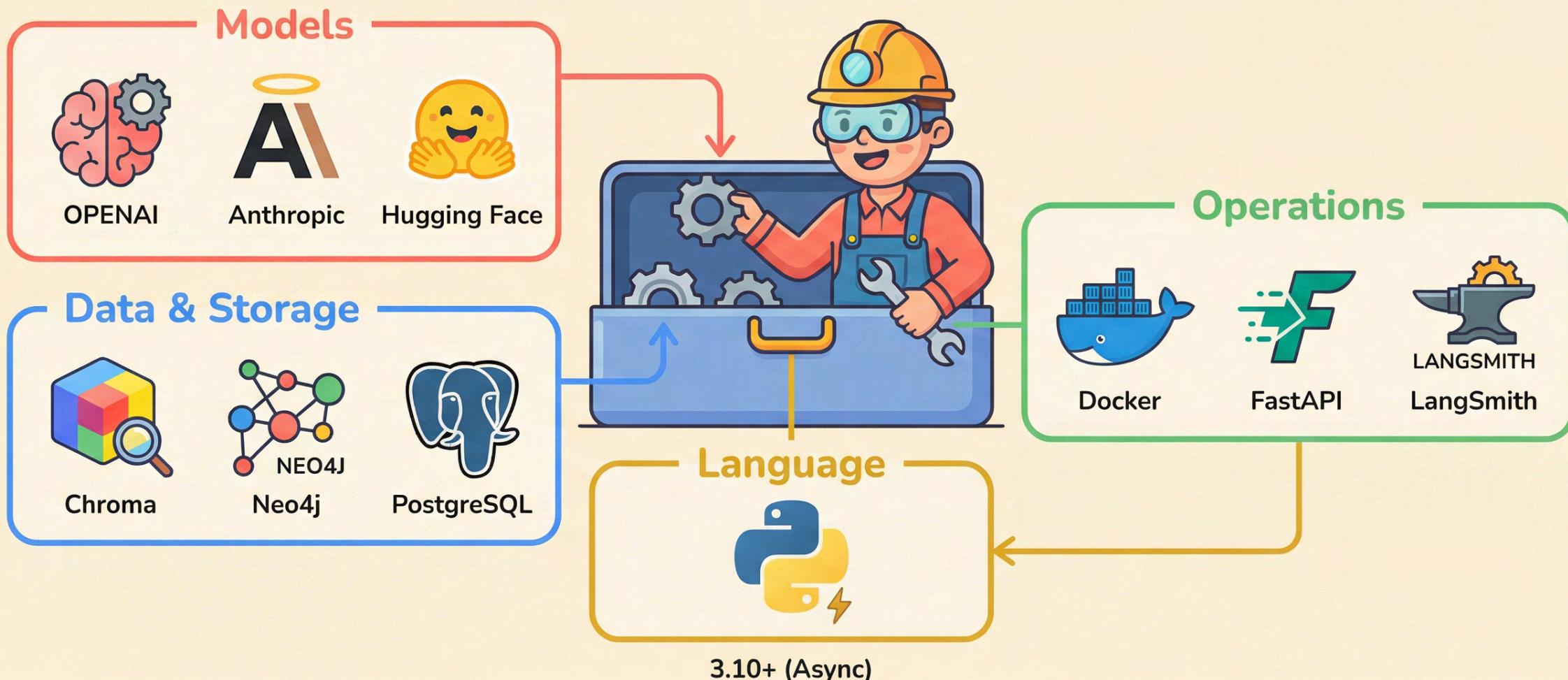
## The Latency Challenge - Optimizing Every Millisecond



**Total Budget: 500ms**

# Our Toolbox

## The Technologies We'll Master



# Are You Ready?

## What You Need to Succeed



Intermediate Python & Git



Docker & Cloud Experience



Warning: We move fast! Terminal comfort required.

# How We Work

## Our Learning Rhythm - Theory + Practice



**Live Sessions:** 3 Hours/Week - Theory & Live Coding



**Homework:** "Build X," not "Read Y" - Active Building



**Community:** Discord Support & Collaboration



**Office Hours:** Direct Instructor Access



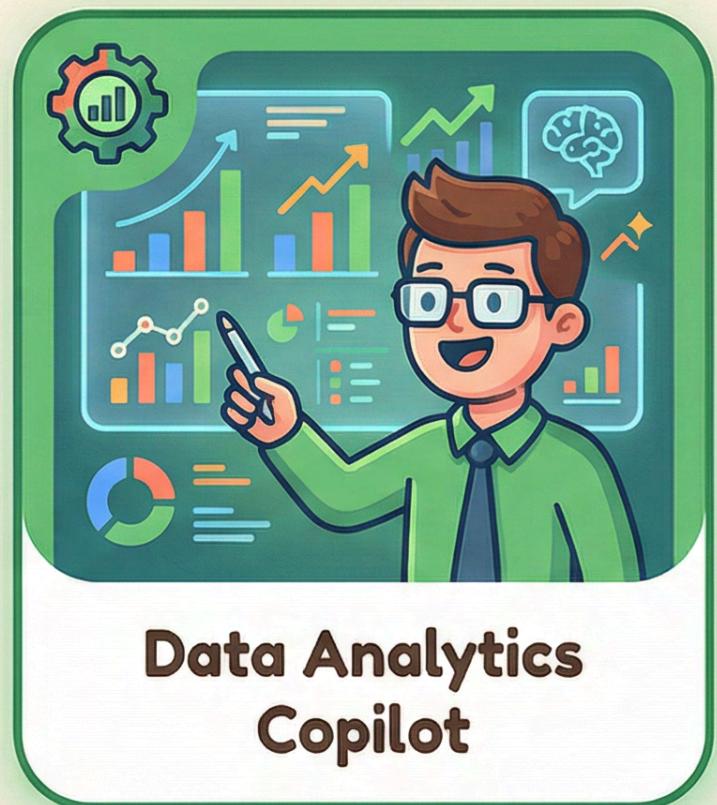
# Your Mission for Today

## Get Ready to Build



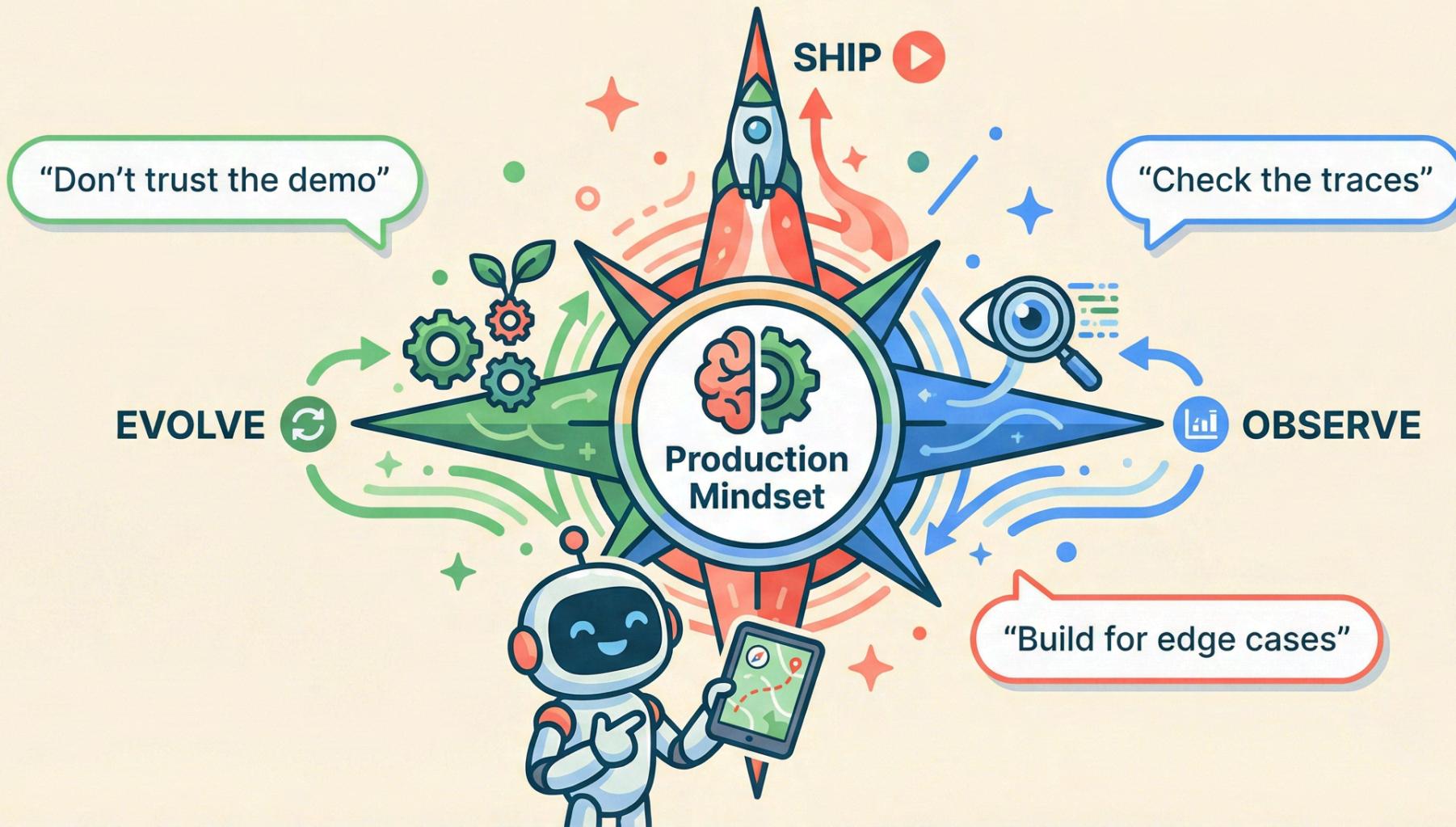
# Real Systems You'll Create

## From Theory to Enterprise



# The North Star - Your Guiding Principle

## Ship. | Evolve. | Observe.



# Let's Build - Questions?

Next Session: Week 1 - Prompt Engineering Essentials



**Complete the Mission  
& Get Ready to Code**