
Build Intelligent Networks with AI

Agenda

-
- 01 Introduction
 - 02 Core Concepts
 - 03 LLMs in Networking
 - 04 Prompt Engineering
 - 05 Risks & Challenges
 - 06 Final Takeaways & Current Adoption
-



Section 01: Introduction

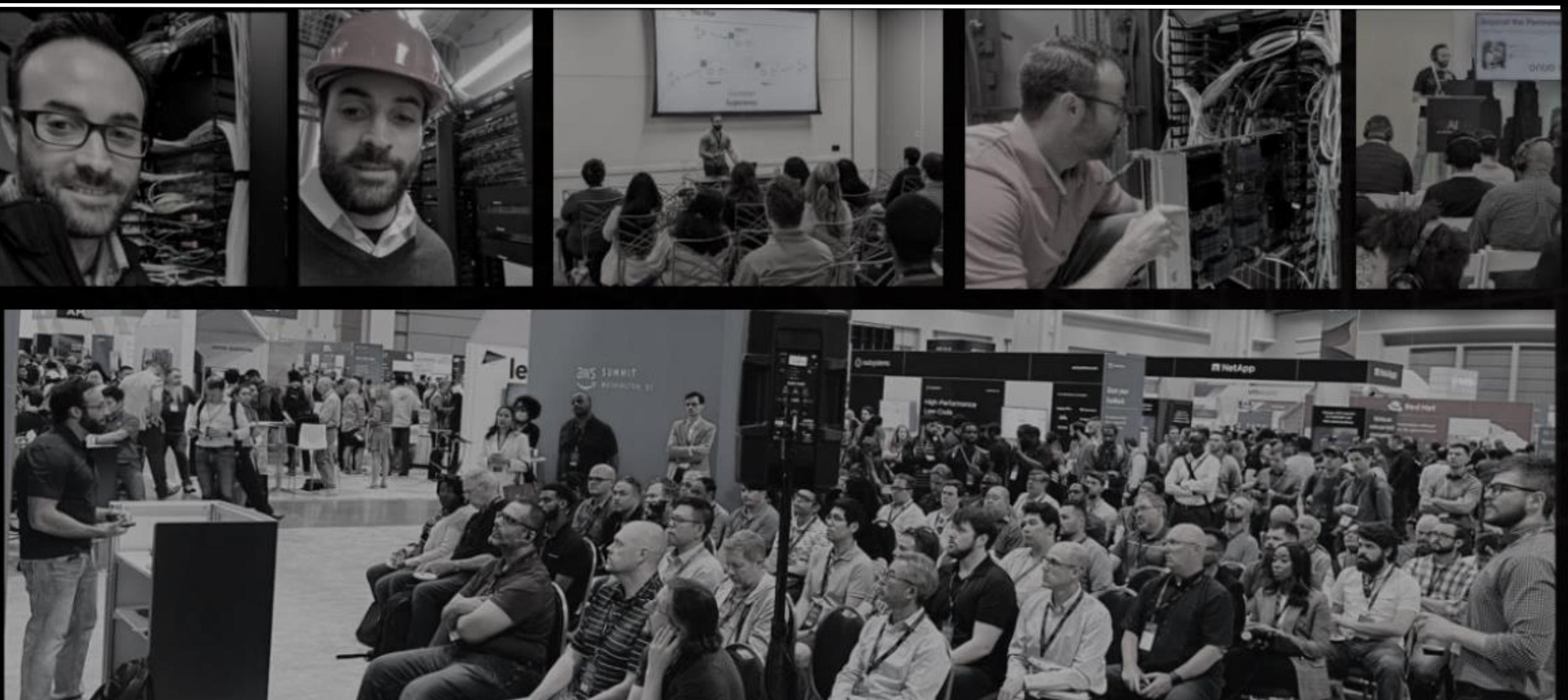


About William

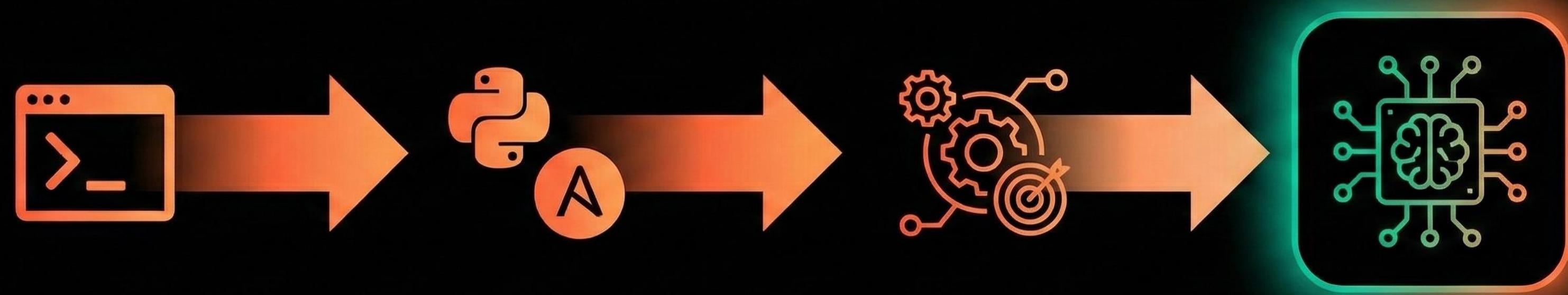
Tech Evangelist, Podcaster, Community Builder

- 20 years experience
- LinkedIn Learning Instructor
- Host of The Cloud Gambit Podcast (Packet Pushers Family)

Let's Connect!



Why are we here? – The shift in NetOps



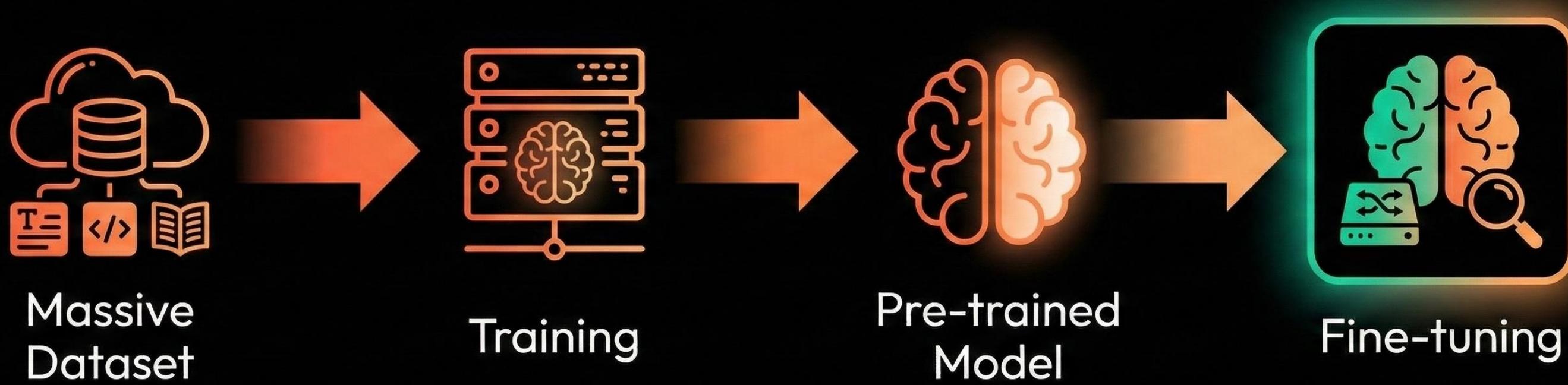
Manual CLI typing

Scripts & Automation
(Python/Ansible)

Intent-Based
Networking

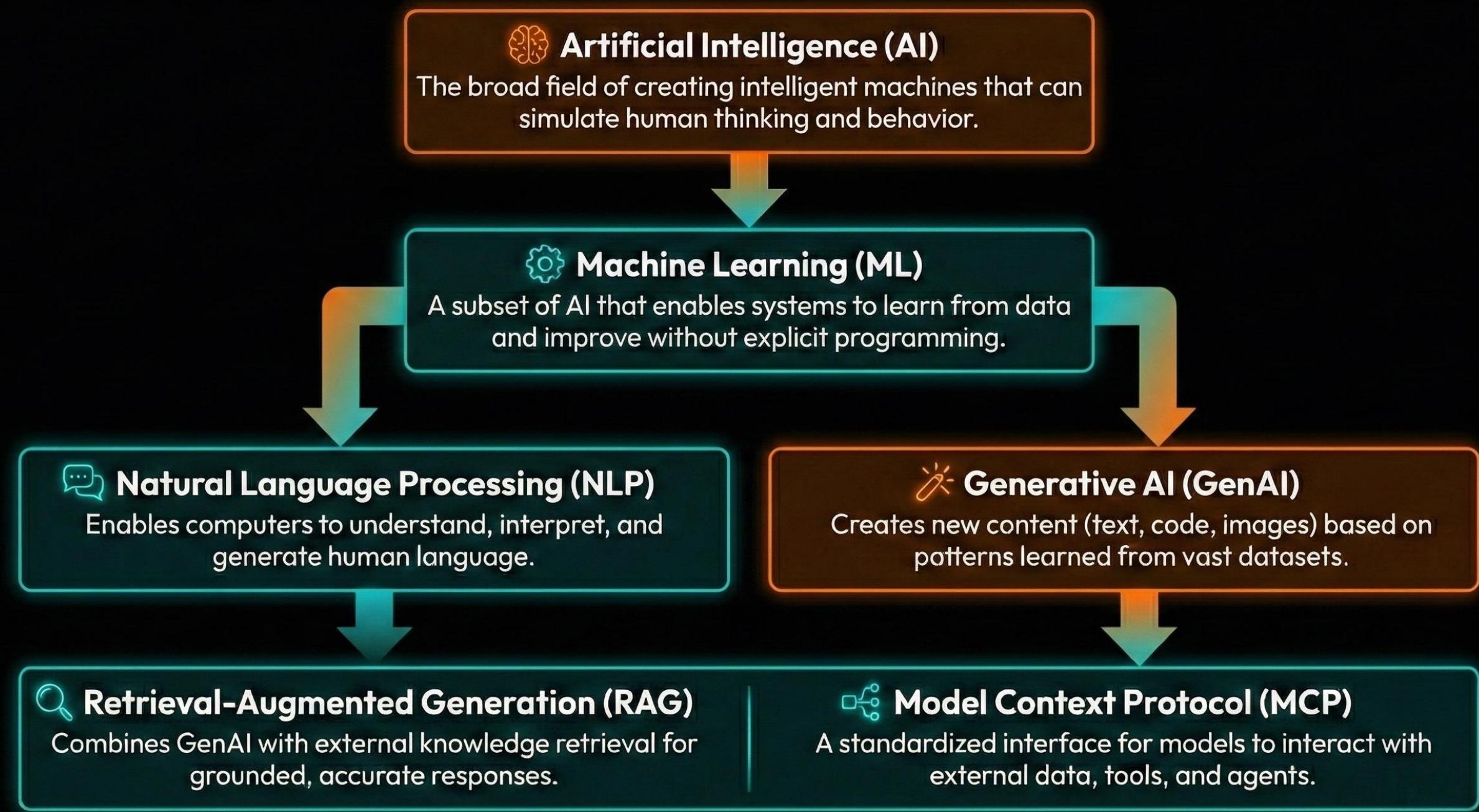
AI-Assisted
(Cognitive Networking)

What is a Large Language Model (LLM)?



A probabilistic model that predicts the next token based on context.

Understanding the Hierarchy



Section 02: Core Concepts

If our brains were simple enough
for us to understand them, we'd
be so simple that we couldn't.

- Ian Stewart
(The Collapse of Chaos)

Tokens & Context Windows

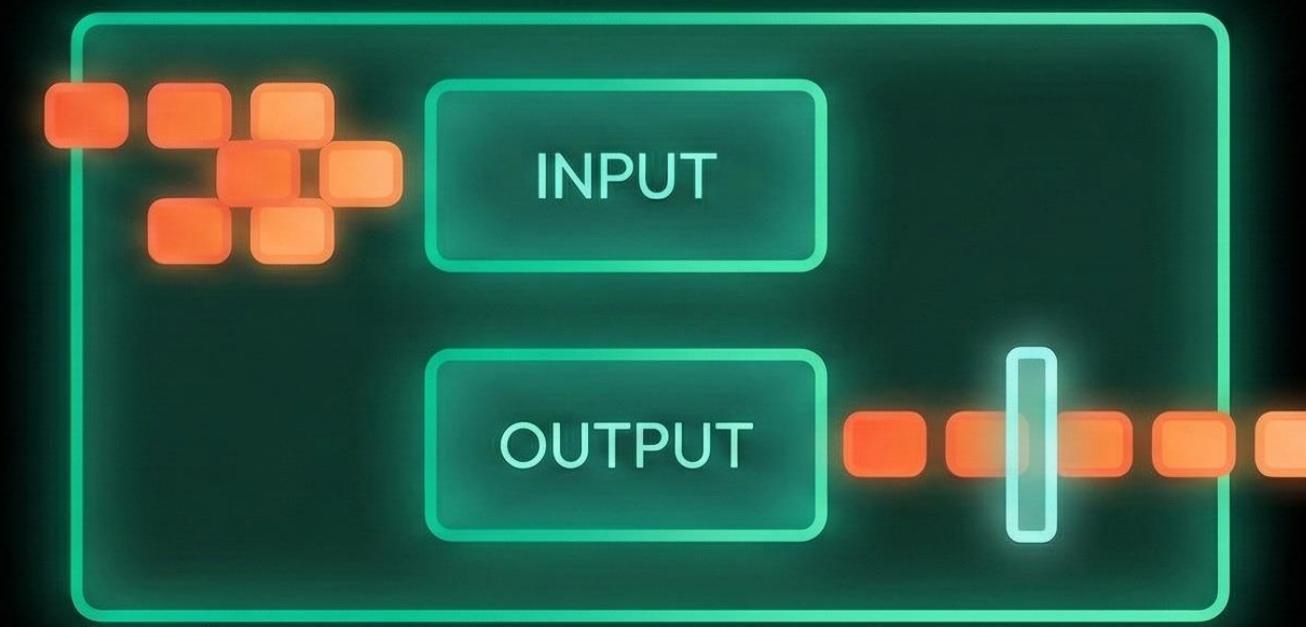
Tokens



Interface Gig 0 / 1

Tokens ≈ parts of words
(approx. 0.75 words)

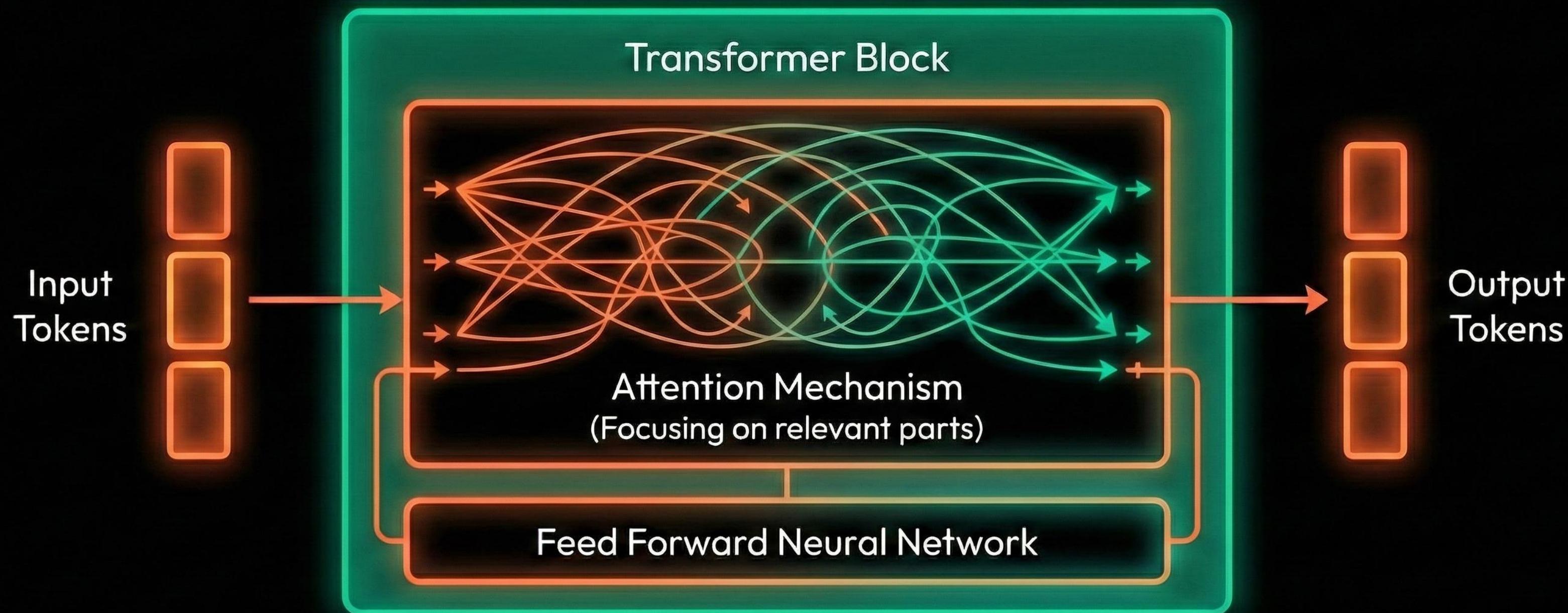
Context Window



OUTPUT

Context Window =
Short-term memory
(input + output limit)

The Transformer Architecture

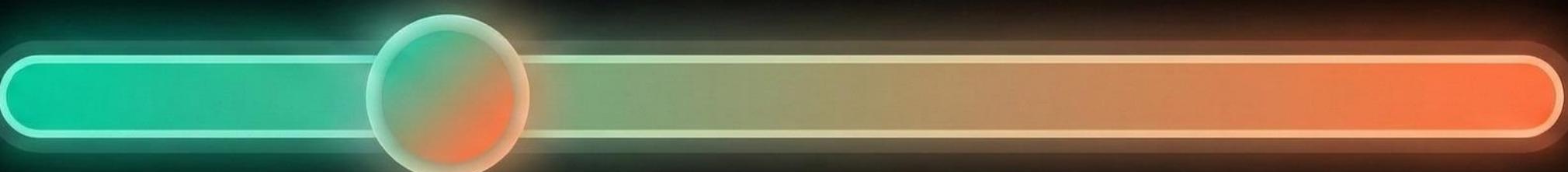


Temperature & Determinism

0.0 (Low Temp)



Consistent,
Factual, Rigid.
(Good for Configs)



Determinism

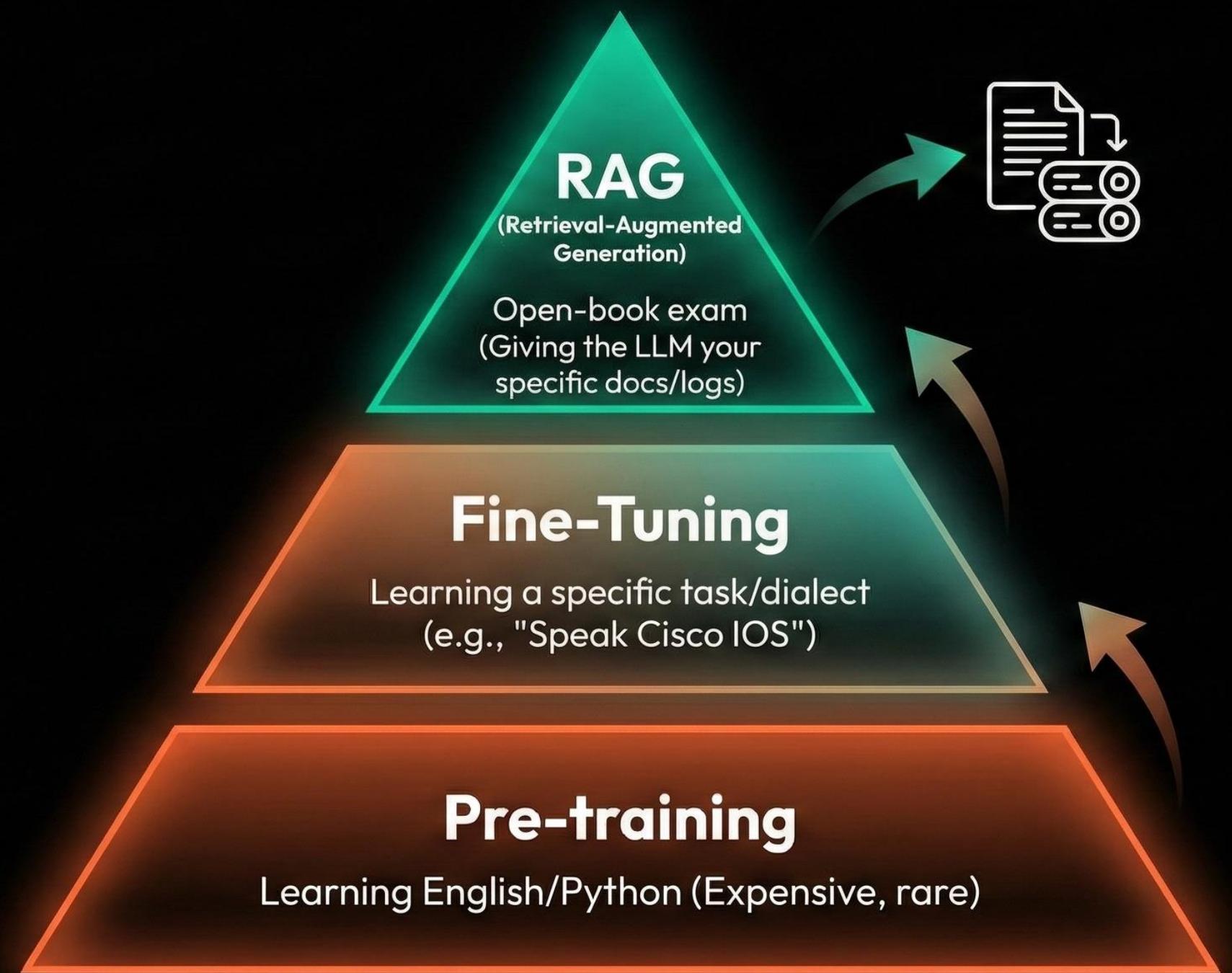
Creativity

1.0 (High Temp)



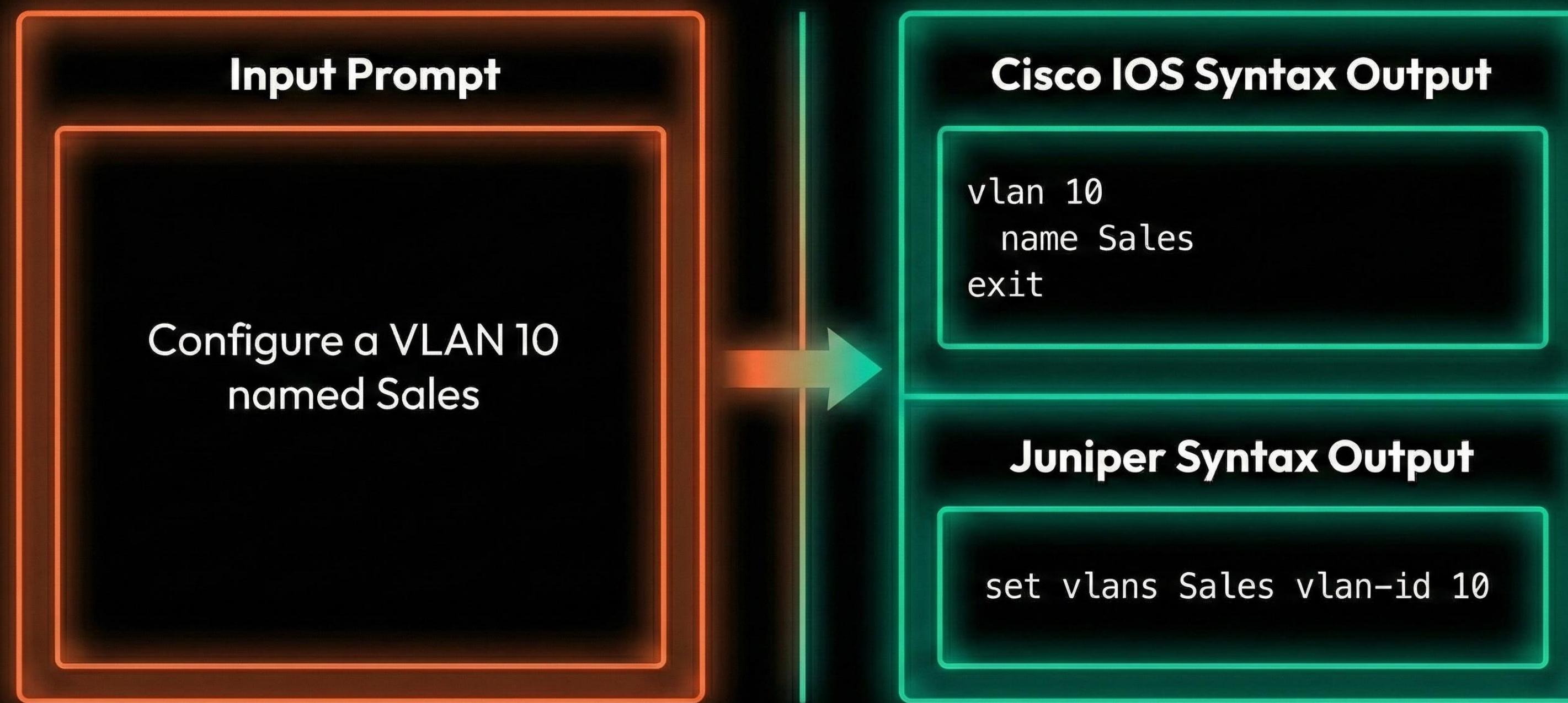
Creative,
Diverse,
Random.
(Good for
Brainstorming)

Training vs. Fine-Tuning vs. RAG



Section 03: LLMs in Networking

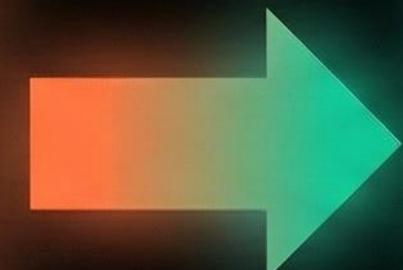
Use Case 1: Configuration Generation & Translation



Use Case 2: Troubleshooting Assistant

Log Entry Input

```
Jan 20 07:12:05 router1
%OSPF-5-ADJCHG: Process 1, Nbr
10.0.0.2 on GigabitEthernet0/1
from FULL to DOWN, Neighbor
Down: Dead timer expired
```



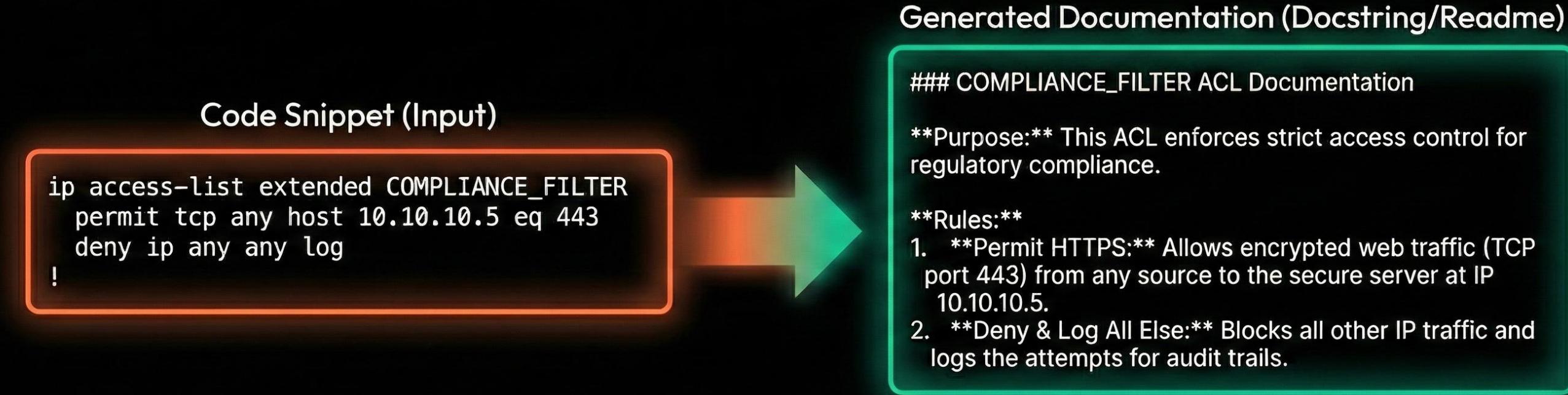
LLM Analysis Output

Analysis: OSPF neighbor 10.0.0.2 on Gig0/1 went DOWN from FULL state.
Reason: Dead timer expired (no Hellos received).

Possible Causes:

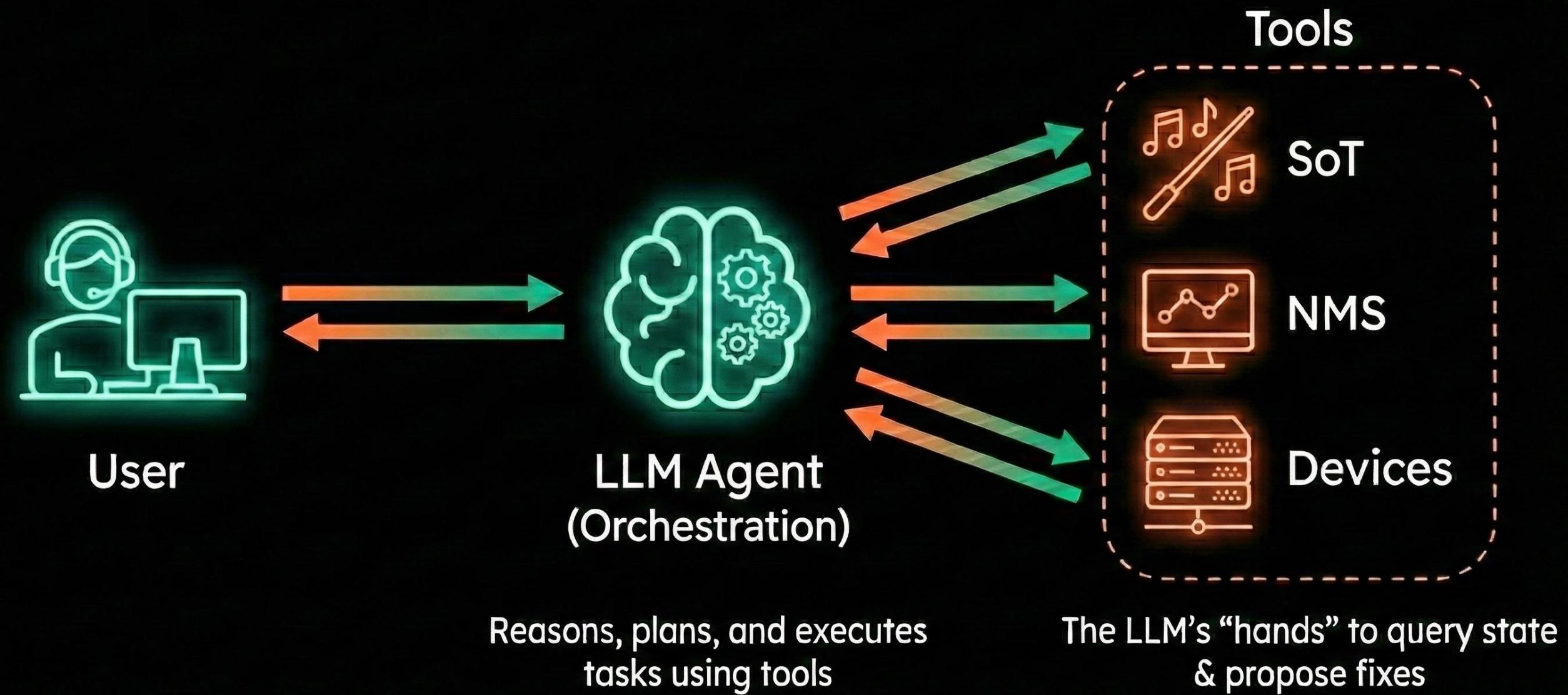
1. Layer 1/2 link issue.
2. Layer 3 connectivity loss (ping failed).
3. Mismatched Hello/Dead timers.
4. MTU mismatch.

Use Case 3: Documentation & Tests

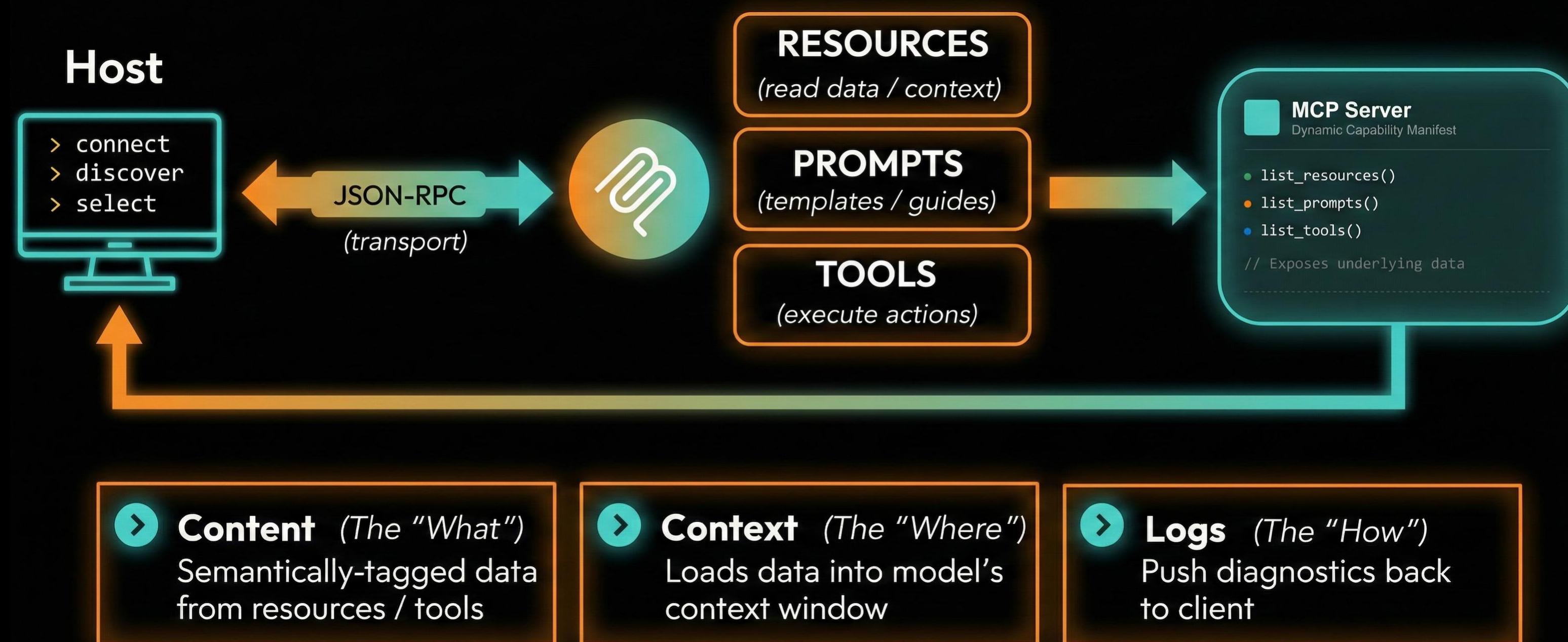


- 📄 Automates network documentation
- 🔍 Reverse engineers complex configs (e.g., ACLs)
- 🧪 Writes Pytest/Ansible test cases

Agentic Workflows (Copilot)



MCP (Model Context Protocol)



Section 04: Prompt Engineering

Elements of a Good Prompt



Bad Prompt

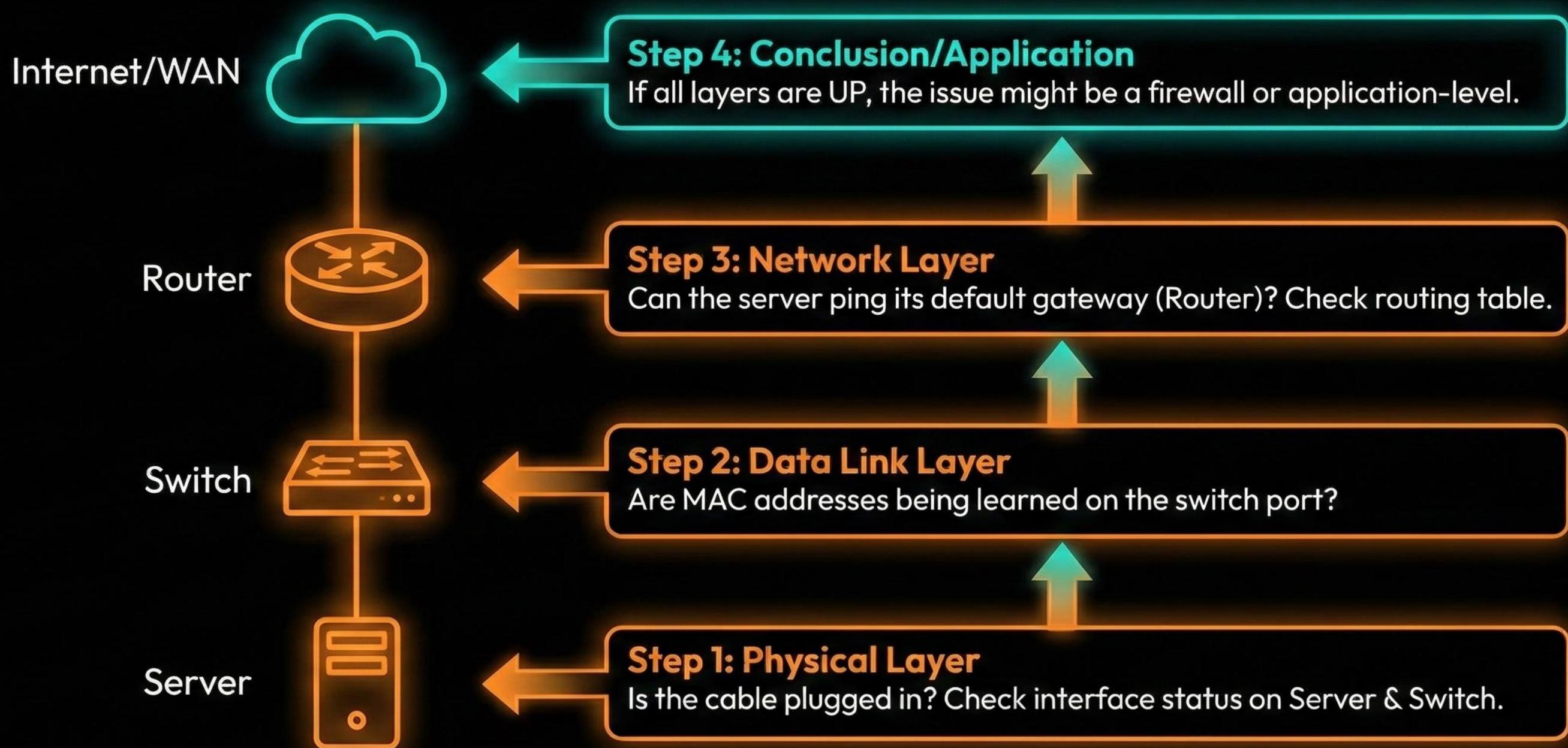
"Fix the config."

Good Prompt

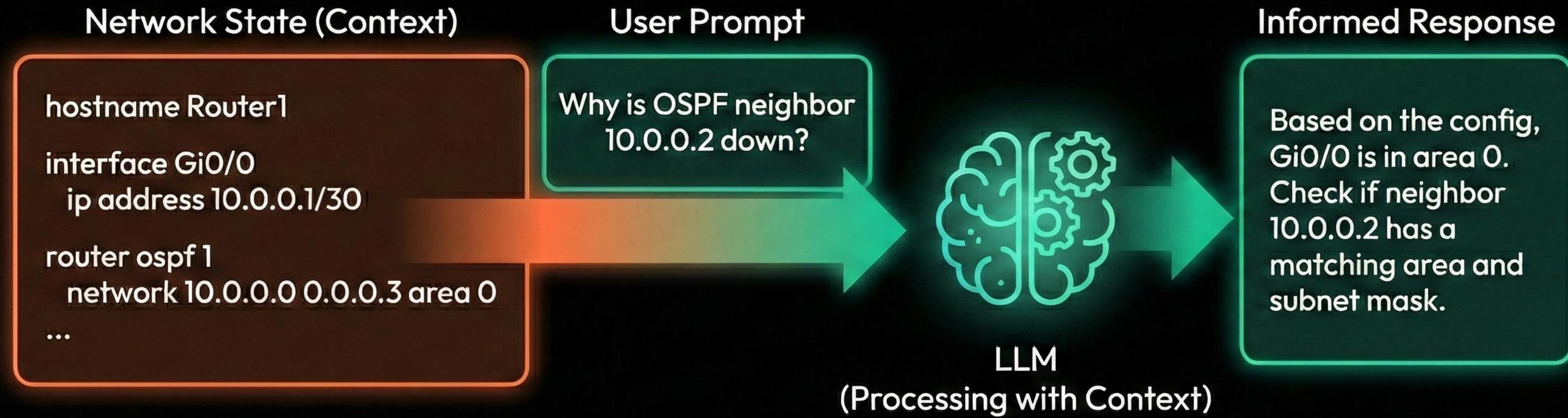
"Act as a Sr. Network Engineer. Review the attached OSPF config for best practices. Identify missing auth. Output as JSON."

- Be specific.
- Garbage In, Garbage Out.
- Ask for structured output (JSON/YAML) for automation pipelines.

Chain of Thought



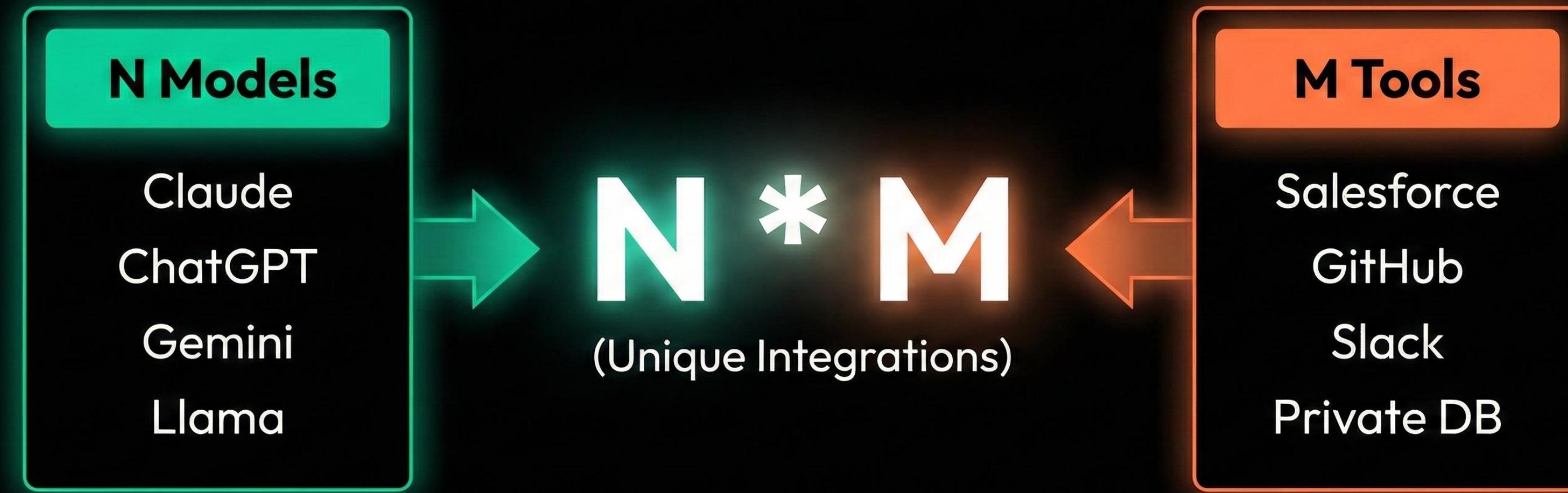
Context is King



- The model doesn't know *your network* unless you tell it.
- Providing topology data, schema, or config dumps is essential.

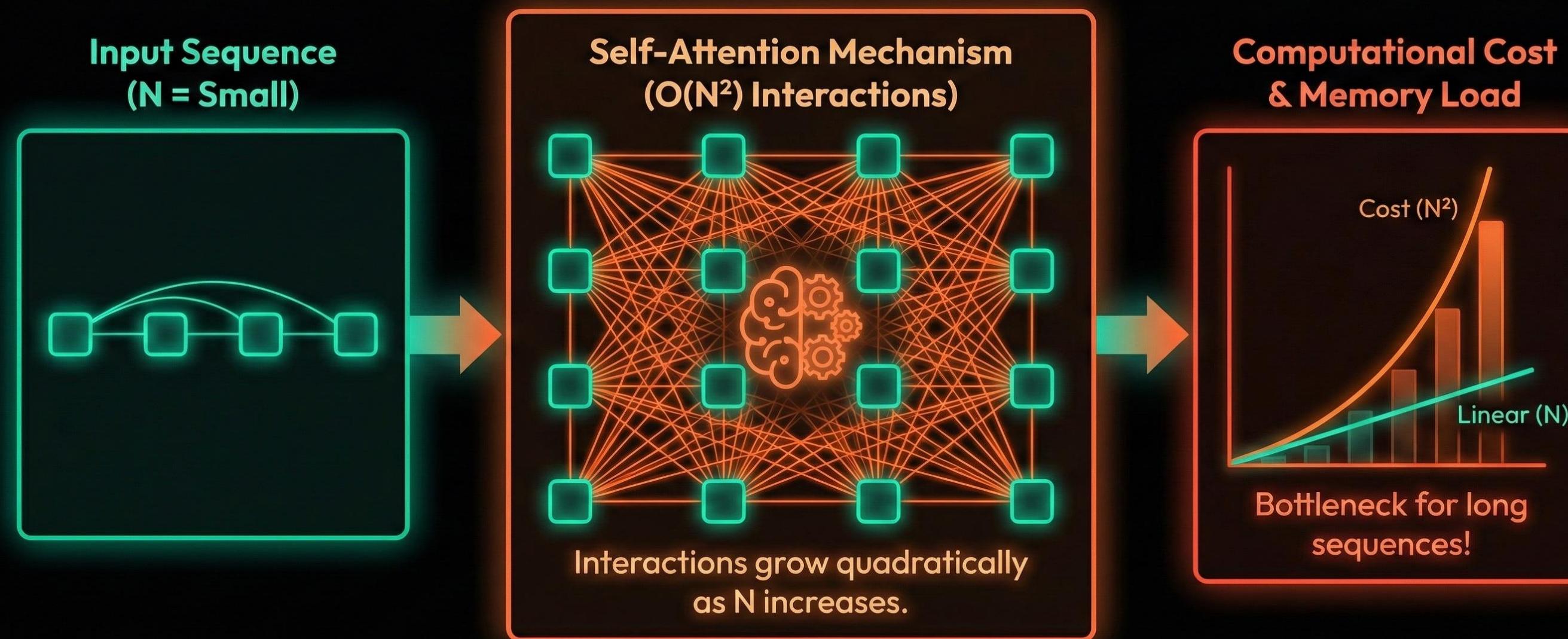
Section 05: Risks & Challenges

The N * M Problem

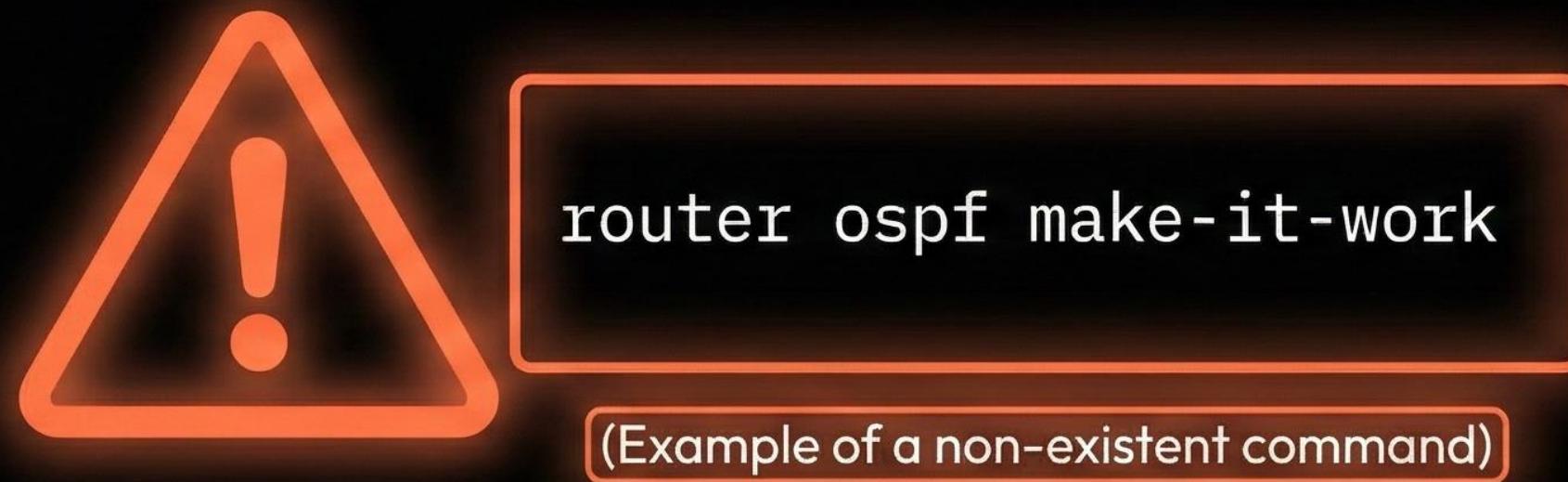


4 models with access to 10 tools = 40 separate integrations

Quadratic Complexity in LLM Self-Attention



Hallucinations & Confabulations



- LLMs are confident liars.
- They predict what sounds good, not necessarily what is true.
- Rule #1: Always verify the output (Human in the loop).

Security & Data Privacy



- Do not paste passwords/keys into public chatbots.
- Sanitize configs.
- Enterprise controls vs. Public APIs.

Section 06: Final Takeaways & Adoption

Market Framing



Goal-driven Agents with memory, planning, and the ability to make decisions



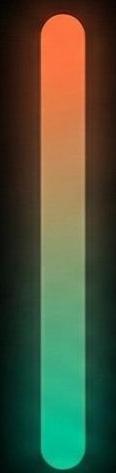
Sees humans transition from “In the Loop”, to “On the Loop”, to eventually “Out of the Loop”



Detects, analyzes, and remediates network issues in near real-time (Your 24/7 Agent Driven NOC)

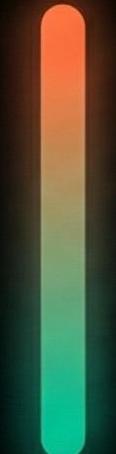


Well integrated and Insight driven action across multi-vendor infrastructure domains



The Definition

Goal-driven, autonomous AI agents that operate network tasks and processes independently – from and on behalf of humans



The Goal

Transformation to a truly autonomous network with near real time self-healing capabilities that decreases reliance on “human” resources

Current Adoption



Agentic NetOps Will
Revolutionize Network
Operations

Current Adoption is Near Zero

Research points out that adoption, today, is less than 1% and describes vendor capabilities as “embryonic”

Slow Automation Progress

Gartner estimates that two-thirds of network tasks are still performed manually, indicating a multi-year journey just to get to the point where agentic systems are feasible.

Unclear Business Value

Polling found that 58% of organizations are open to using GenAI but are waiting for “clear use cases with proven business value”.

Projected Adoption



Agentic NetOps Will
Revolutionize Network
Operations

Strategic Planning Assumptions

- By 2030, 50% of organizations will use agentic NetOps with minimal human involvement, up from nearly 0% in 2025.
- By 2030, agentic NetOps with a network AI assistant will be the primary UI used in network operations.
- Low adoption rate is primarily due to limited vendor capabilities and organizational readiness to deploy. Mainstream adoption is expected to take between five and ten years.

Thank You

Workshop

9-930 AM **Keynote, by Eric Chou**

930-1015 AM **LLM Fundamentals for Network Engineers (Lecture)**

1015-1100 AM **Lab 1 - AI Copilots for Network Automation**

15 Minute Break

1115-1215 PM **Lab 2 - Building an MCP Server for Network Operations**

1215-100 PM **Lab 3 - AI Powered Network Observability**

15 Minute Break

115-145 PM **Panel Discussion and AMA**