

Empowering Network Engineers: The adoption of Agentic AI in Network Operations

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Agenda

1. How did we get here?
2. AI for IT Operations (AIOps)
3. What is an AI Agent?
4. Connecting and Enabling Agentic Workflows
5. AI Agents for Network Engineers
6. The next era: AgenticOps

Three Converging Trends:



Agentic AI



AIOps

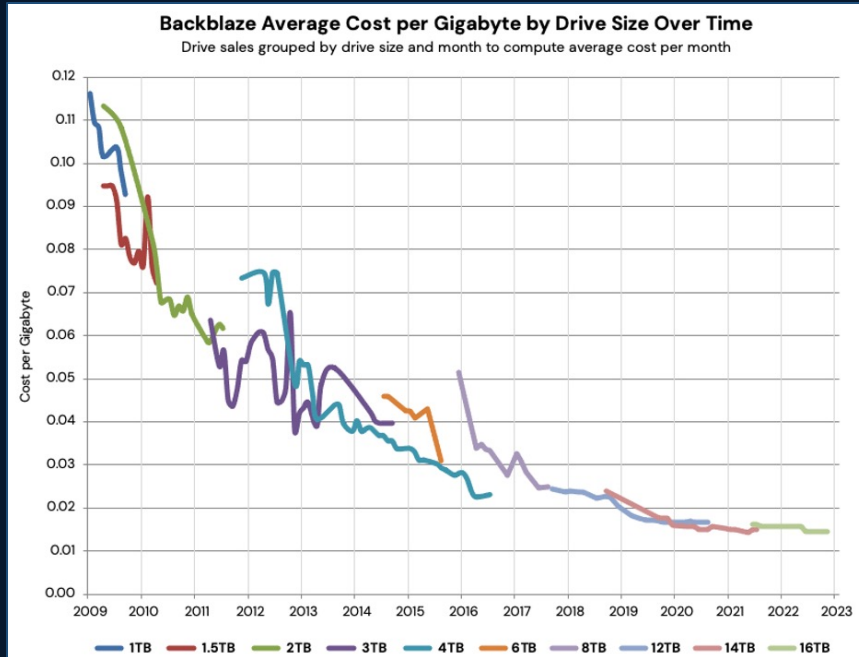


Fragmented Topology

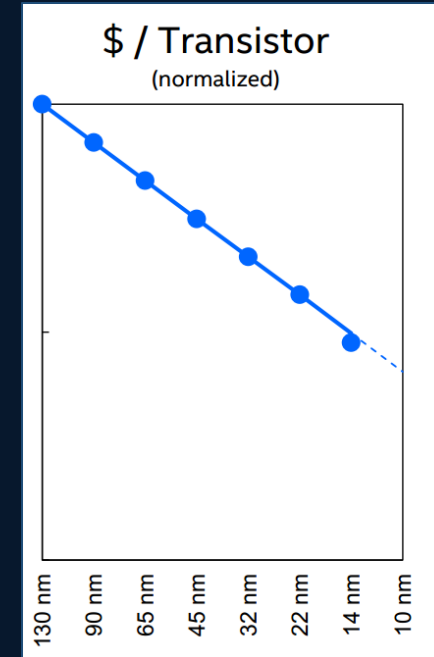
How did we get here?

Trends: Infrastructure

Cheap data storage...



...and cheap processing



Trends: Data

Lots of Data!



WIKIPEDIA
The Free Encyclopedia

Including network data



How did we get here with Generative AI?



Sam Altman ✓
@sama

today we launched ChatGPT. try talking with it here:

chat.openai.com

11:38 AM · Nov 30, 2022



ChatGPT: Optimizing Language Models for Dialogue

We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests. ChatGPT is a sibling model to InstructGPT, which is designed to follow an instruction in a prompt and provide a response.

How did we get here with AIOps?

Multiple monitoring tools,
incomplete visibility

Fragmented topology and
changes



A single incident causes
multiple alerts

Desire to move from reactive
to proactive ITOps

Limited business context

How did we get here with AIOps?



More connected devices = better observability = more data = better AIOps.

AI for IT Operations (AIOps)

Cisco Enterprise Networking: AI Powered Since 2016



Cisco AI
Launch



AI Network
Analytics
added to
Catalyst
Center



AI Endpoint
Analytics
Hardware
Sensor data
collection



AI-RRM
AI Endpoint
Analytics spoof
Detection
Big Data
Reporting



Assurance
Site Analytics
Cloud Based
Spoof
Detection



ISE Data
collection
ISE ML
Device
Profiling

2018

2019

2020

2021

2022

2023

Industry **Largest** AI Networking Data Lake

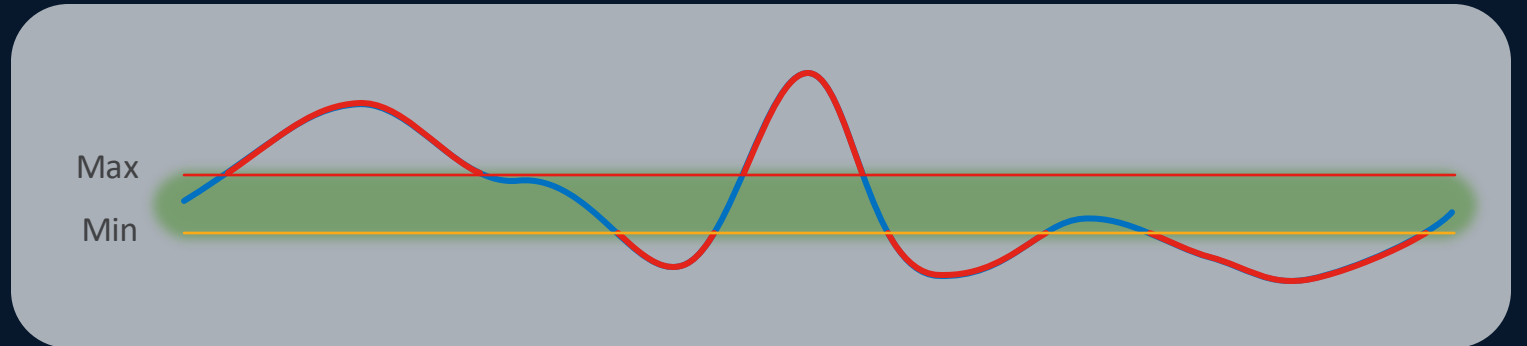
- Over 6 petabytes of network data collected to-date
- 12 billion model inferences per week
- 6 billion onboarding events are observed per week
- Serving 50,000 ML models to deliver optimal performance

Catalyst Center Customers using AI-enabled features

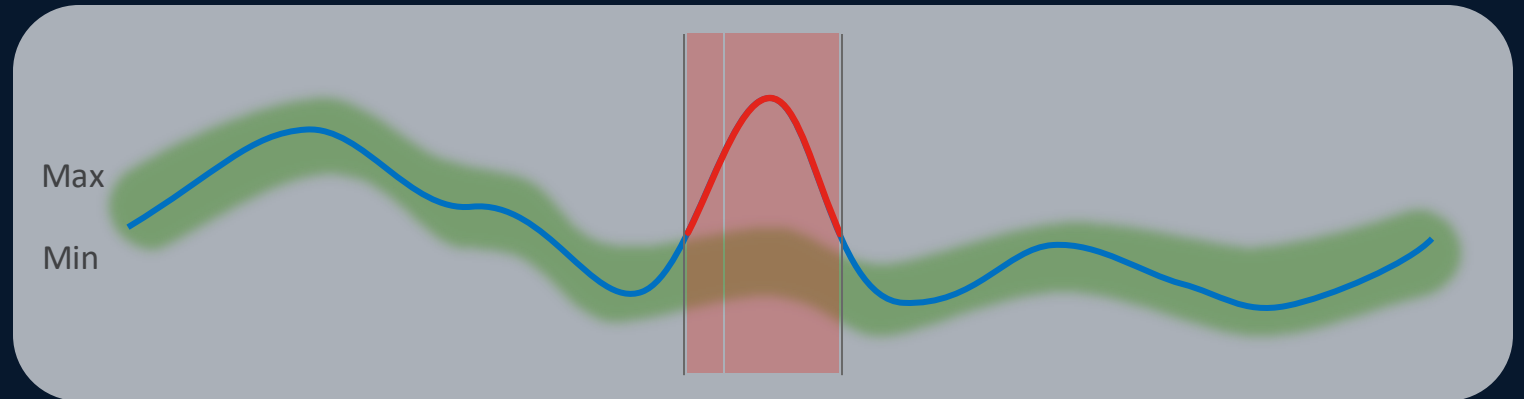
- Identify issues before your users do
- Speed up time to resolution
- Increase network security & performance

AI Dynamic Baselining

Before: Numerical thresholds = alert overload



AI-driven: Dynamic baselines = relevant anomalies



1

Every device is a sensor

2

Learn network trends

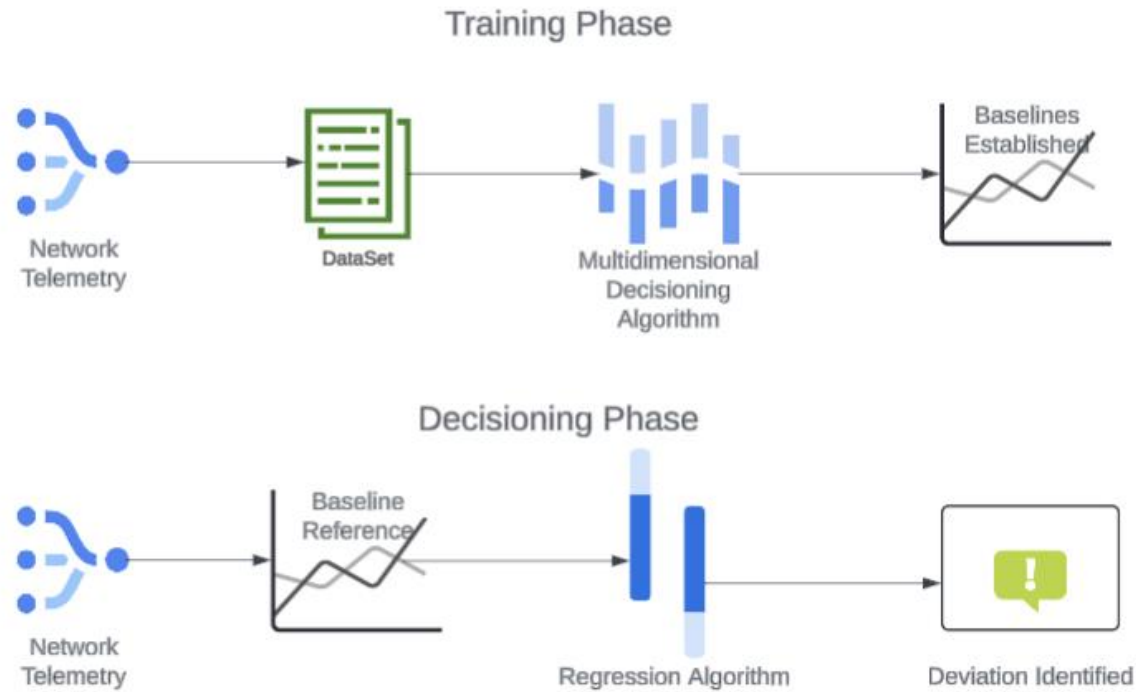
3

Create "normal" baseline

4

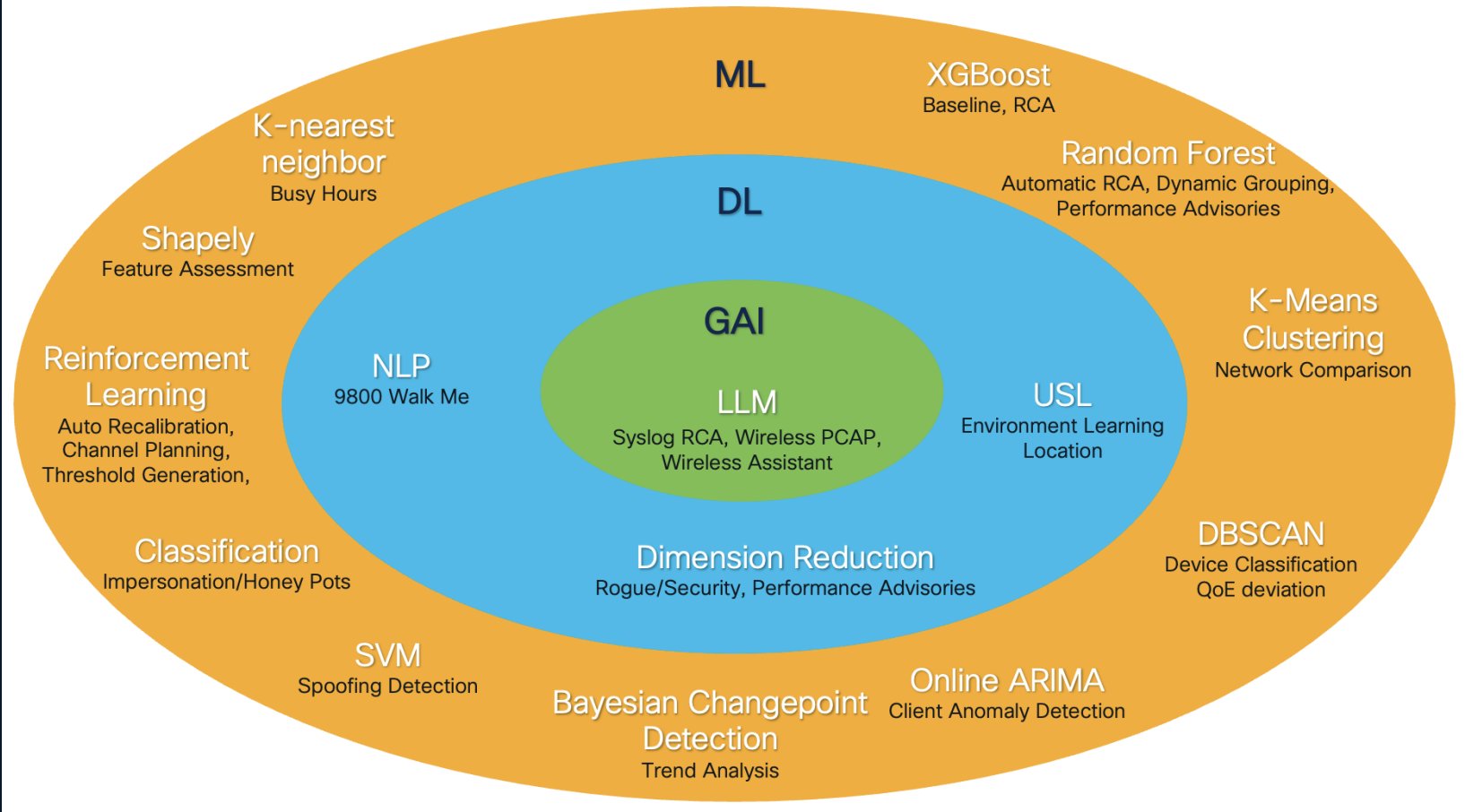
Alert only relevant issues

Dynamic Baseline



- Multidimensional Decisioning Algorithm establishes baselines based on network telemetry
- Regression algorithms identify outlier behavior
- Deviations from this behavior are flagged
- Alerts are created

AI Radio Resource Management (AI-RRM)



Network GPT

Instructions

Supported commands

Chat with data from the following Cisco IOS XE Show Commands:

- Show Run
- Show Version
- Show Inventory
- Show Interfaces
- Show IP Route
- Show IP Interface Brief

Simply type prompts related to these commands (or any other question related to IOS XE) in the chat box below.

- Ingest configuration data.
- Ask questions of your configuration.
- Create configurations → apply to network devices.

You: What version am I running?

IOS XE: You are running IOS XE 3.16.0.

You: Do I have a loopback interface?

IOS XE: There is no loopback interface mentioned in the configuration.

You: Can you recommend the configuration for a new interface loopback 125 with a description of "Configured by AI" with an ip address of 192.168.200.200 and that is enabled?

IOS XE: Sure, here's a basic configuration for a new interface Loopback125:

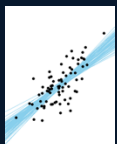
```
interface Loopback125
description Configured by AI
ip address 192.168.200.200 255.255.255.255
no shutdown
```

This configuration sets the IP address and enables the interface. The "no shutdown" command is used to ensure the interface is enabled. Please adjust the subnet mask as per your network requirements.

What is an AI Agent?

Traditional AI/ML vs Generative AI vs AI Agent

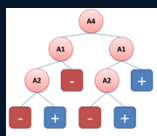
Traditional AI / ML



Regression



Classification

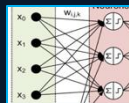


Clustering



Bayesian

Generative AI



Neural Networks

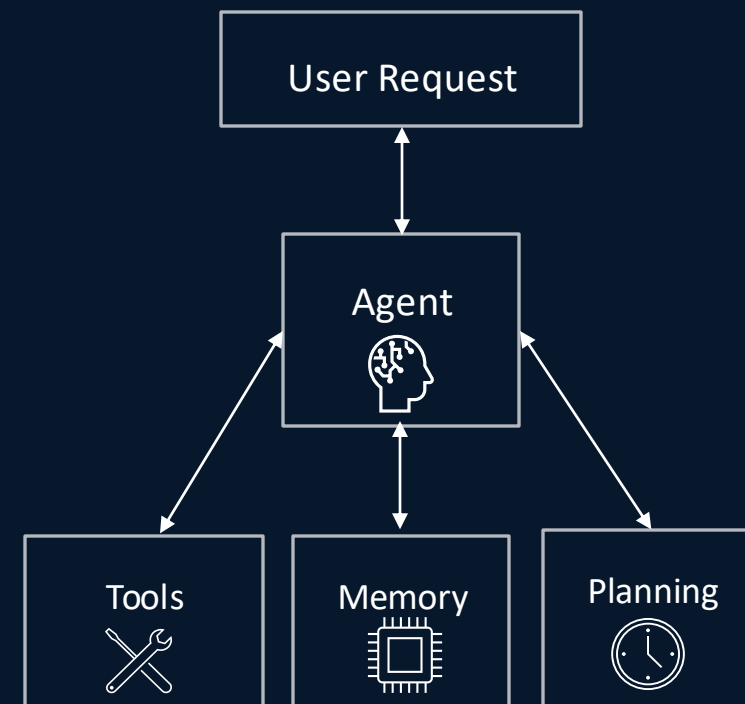


LLMs,
Generative AI



Deep Learning,
NLP

Agentic AI

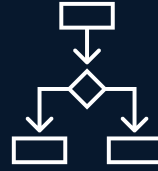


How do we define Agentic AI?



Goal Directed Behavior

AI system pursues objectives, not just single responses



Autonomy and Decision Making

Plans steps and takes actions based on context

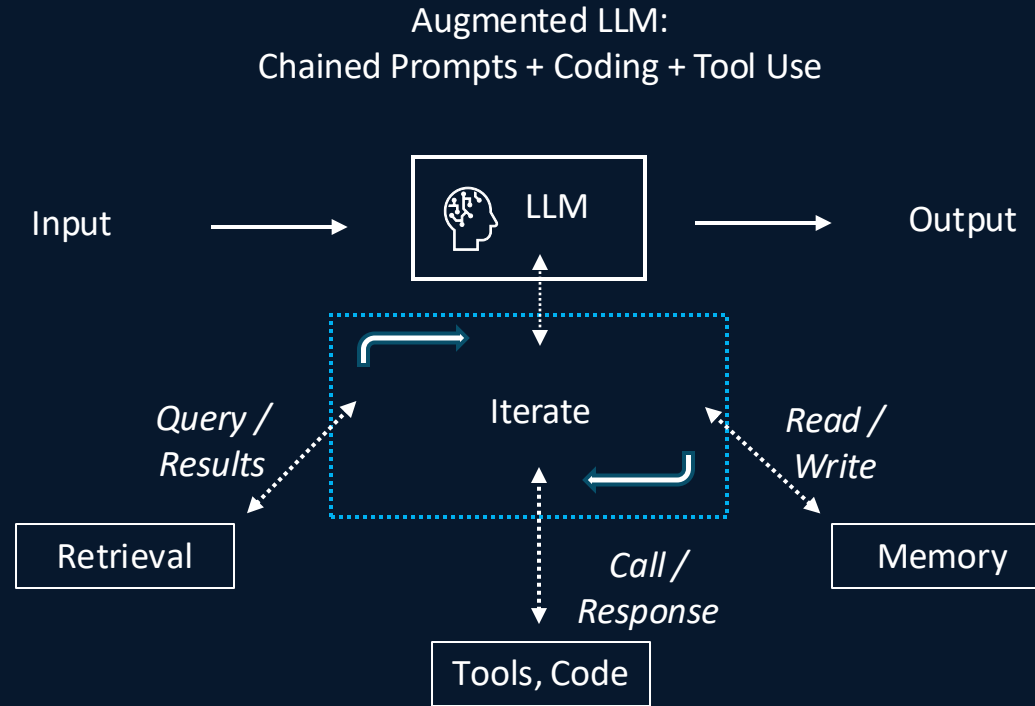


Tool / Environment Interaction

Can call API's, use data sources, use tools, etc. to achieve outcomes

Instead of trying to decide whether an AI application is “Agentic” or not, call everything Agentic and try to understand how much autonomy it has.

AI Agent



- Agentic workflows use one or more LLMs to autonomously perform tasks or make decisions → **significant advancement in LLM reasoning capabilities.**
- Can define a set of rules, goals, and constraints → “agent” determines the sequence of steps and which tools to use.
- Deploying agentic workflows within secure perimeter of the enterprise → safely deploy these LLM advancements.

Analogy: Essay Writing

Non-Agentic Workflow (Zero-Shot)

Prompt (Human Analogy):
Please type out an essay on topic X from start to finish
in one go without using backspace



Usually not our best work!

Inspired by:
Andrew Ng: <https://www.youtube.com/watch?v=KrRD7r7y7NY>

Agentic Workflow (Iterative, Tool Use, etc.)

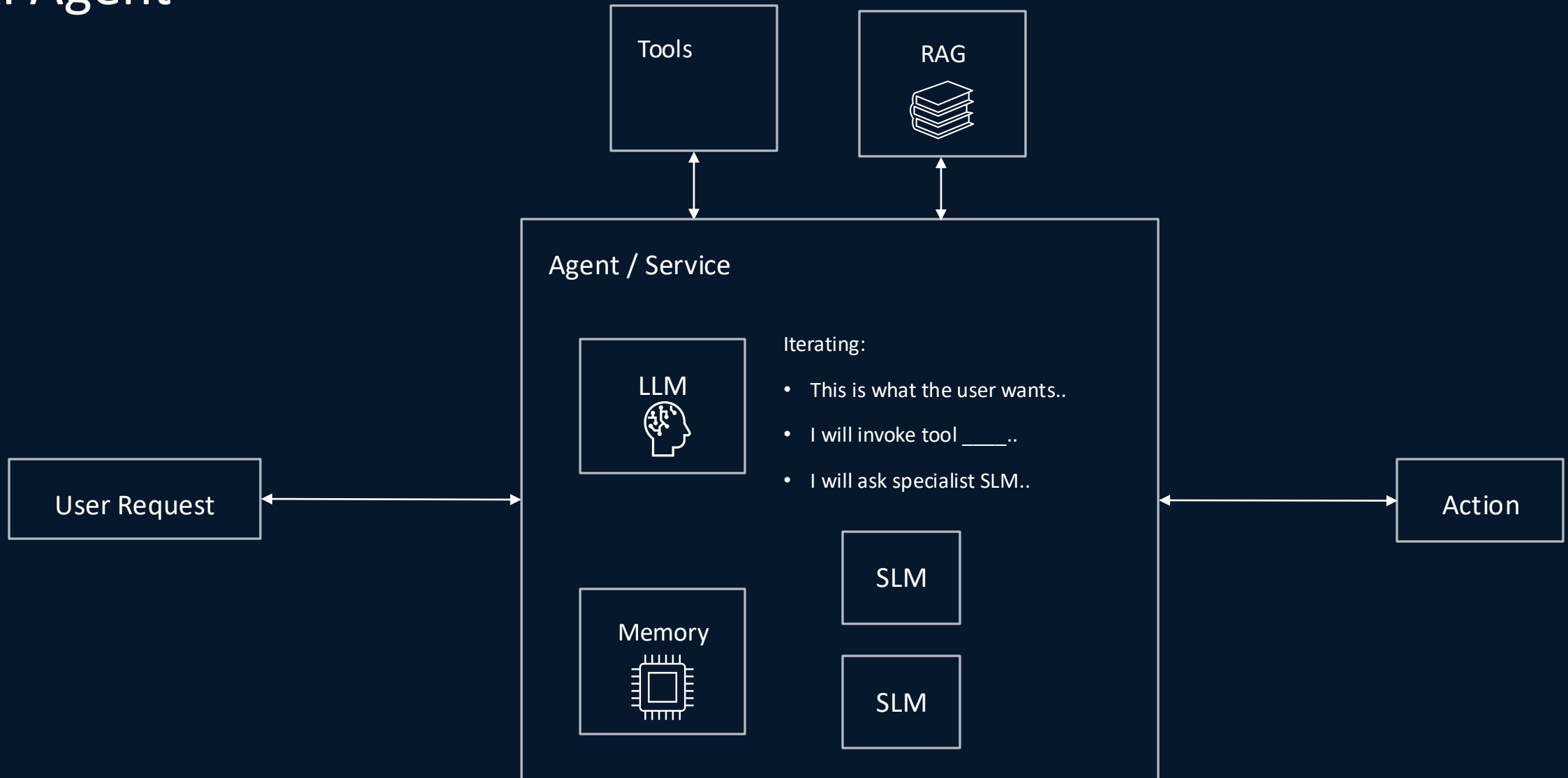
Prompt (Human Analogy):

- Create an **outline** on the topic
- What **information** needed? Where to get it?
- Do the **research**
- Write a **first draft**
- Consider **revisions** or further research.
- Etc.

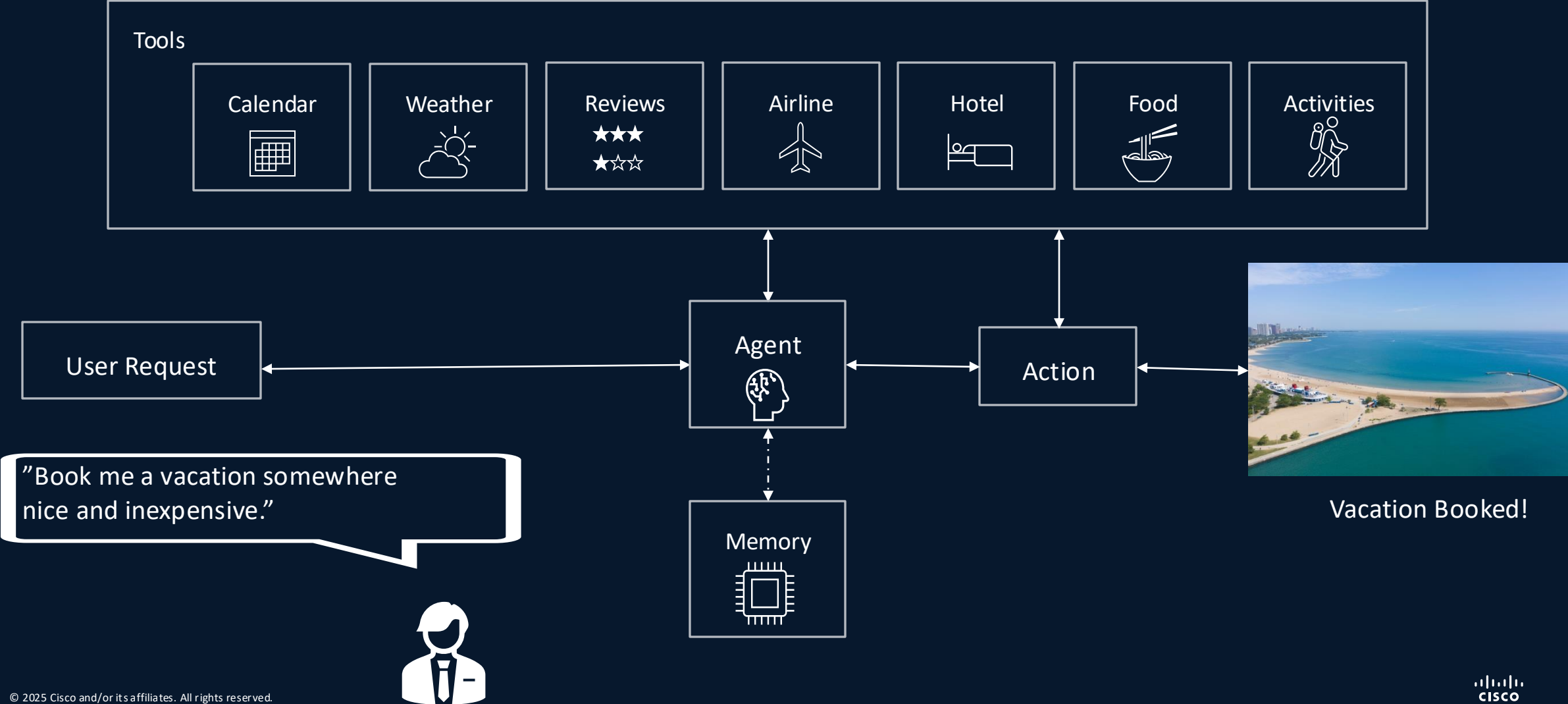


Time consuming, (sometimes messy), iterative ...
but usually better results!

AI Agent



AI Agent Workflow Example



Agentic Frameworks

Applications



Agentic Orchestration
Layer



Foundation Models,
Small Language Models



OpenAI
(ChatGPT)

ANTHROPIC

Anthropic
(Claude)



LLaMA

Gemini

Gemini

Cloud

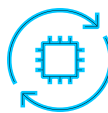


On-Premises

Infrastructure



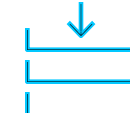
GPU



CPU



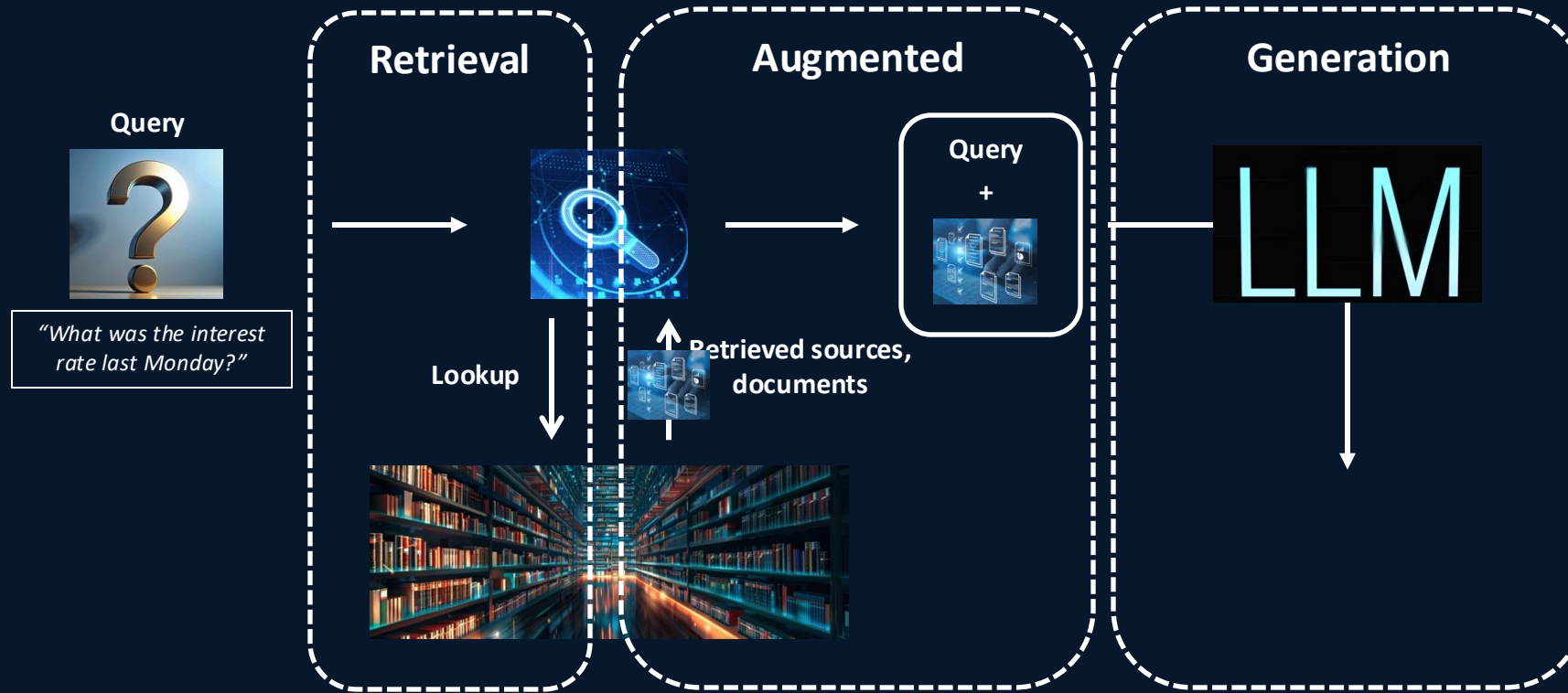
Networking



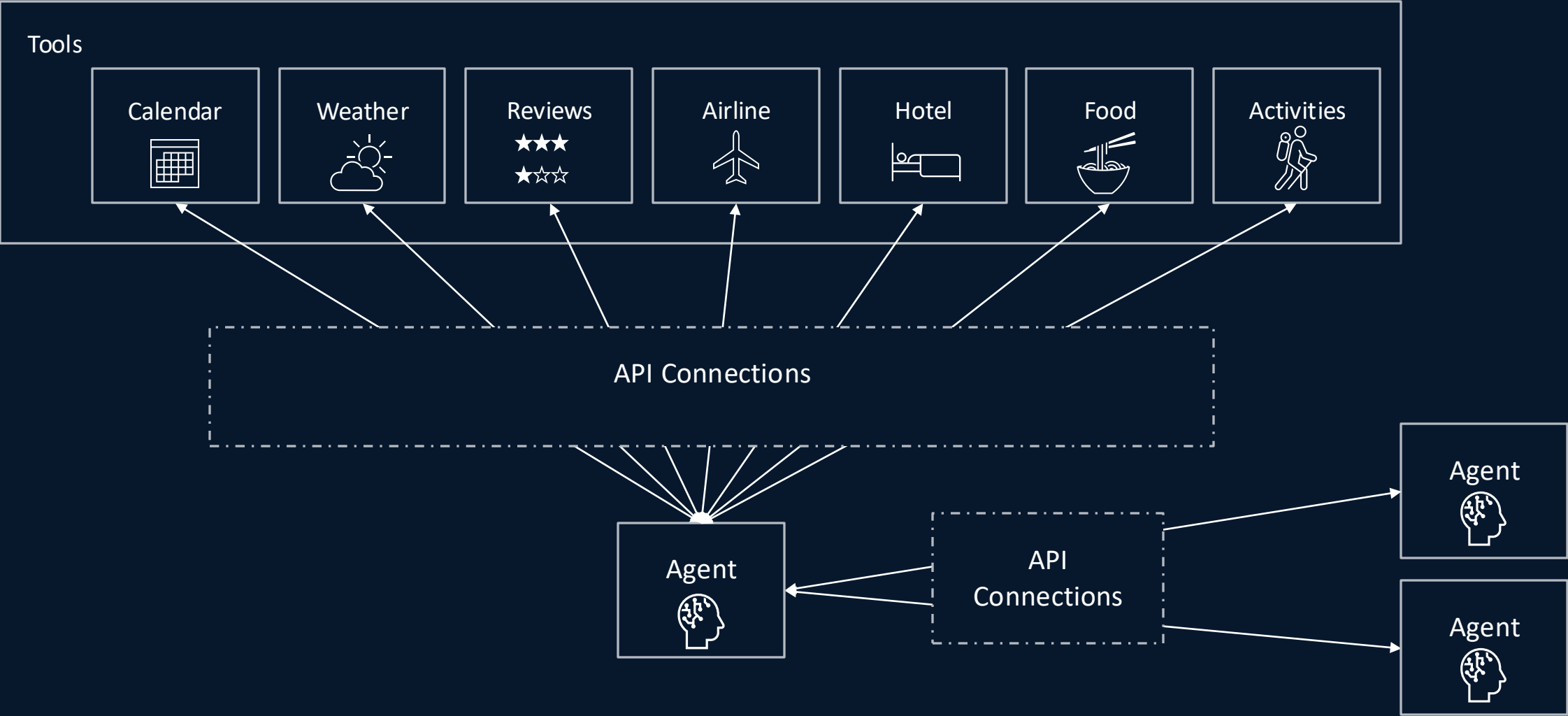
Storage

Connecting and Enabling Agentic Workflows

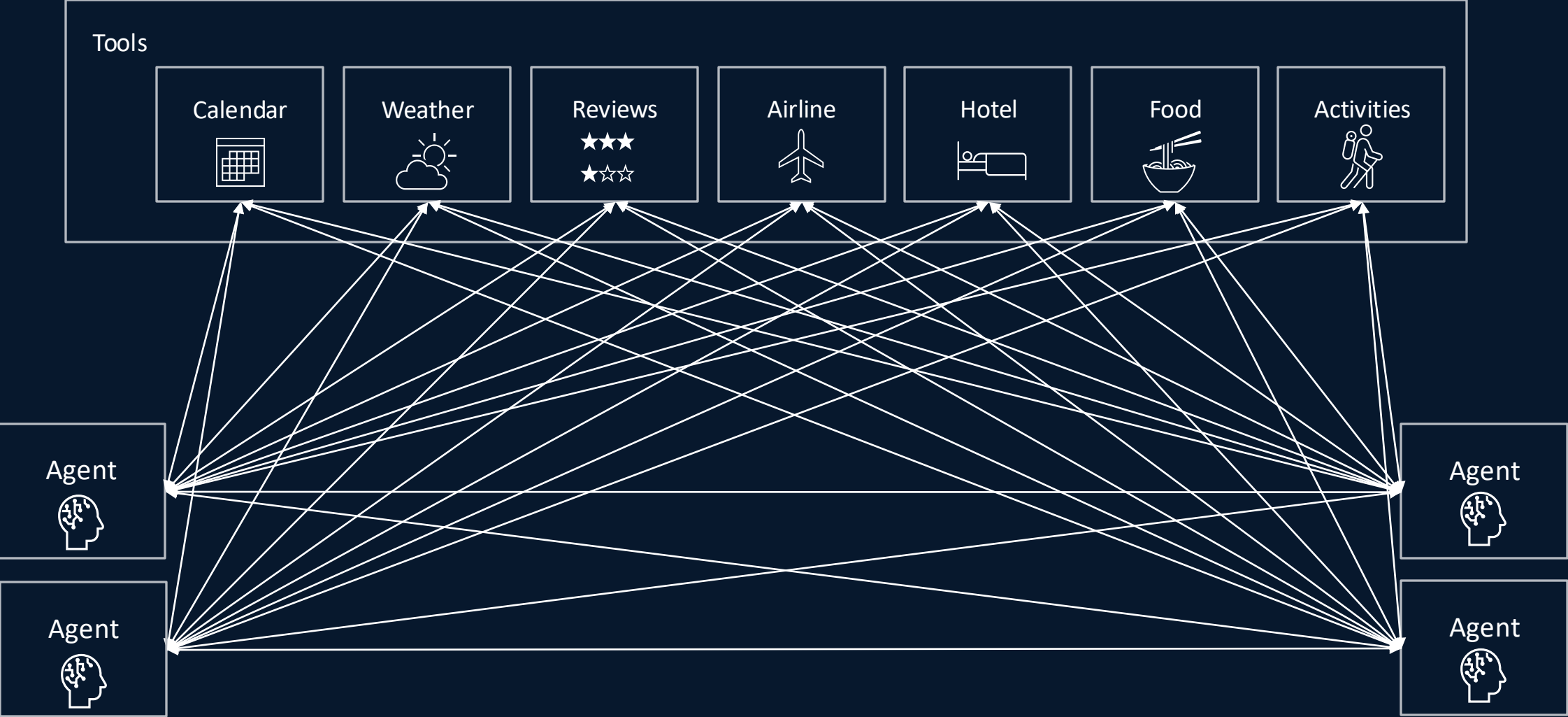
Retrieval Augmented Generation (RAG)



Connecting AI Agent Components: API's



API Scalability



How do we solve this scalability problem?

ANTHROPIC



Introducing: Model Context Protocol (MCP)

Standardized Agent Connectivity

What it is

MCP is an open standard that defines how AI models communicate:

- External tools
- Data sources
- Applications
- Other models / agents

Why it matters

Standardizes model interactions

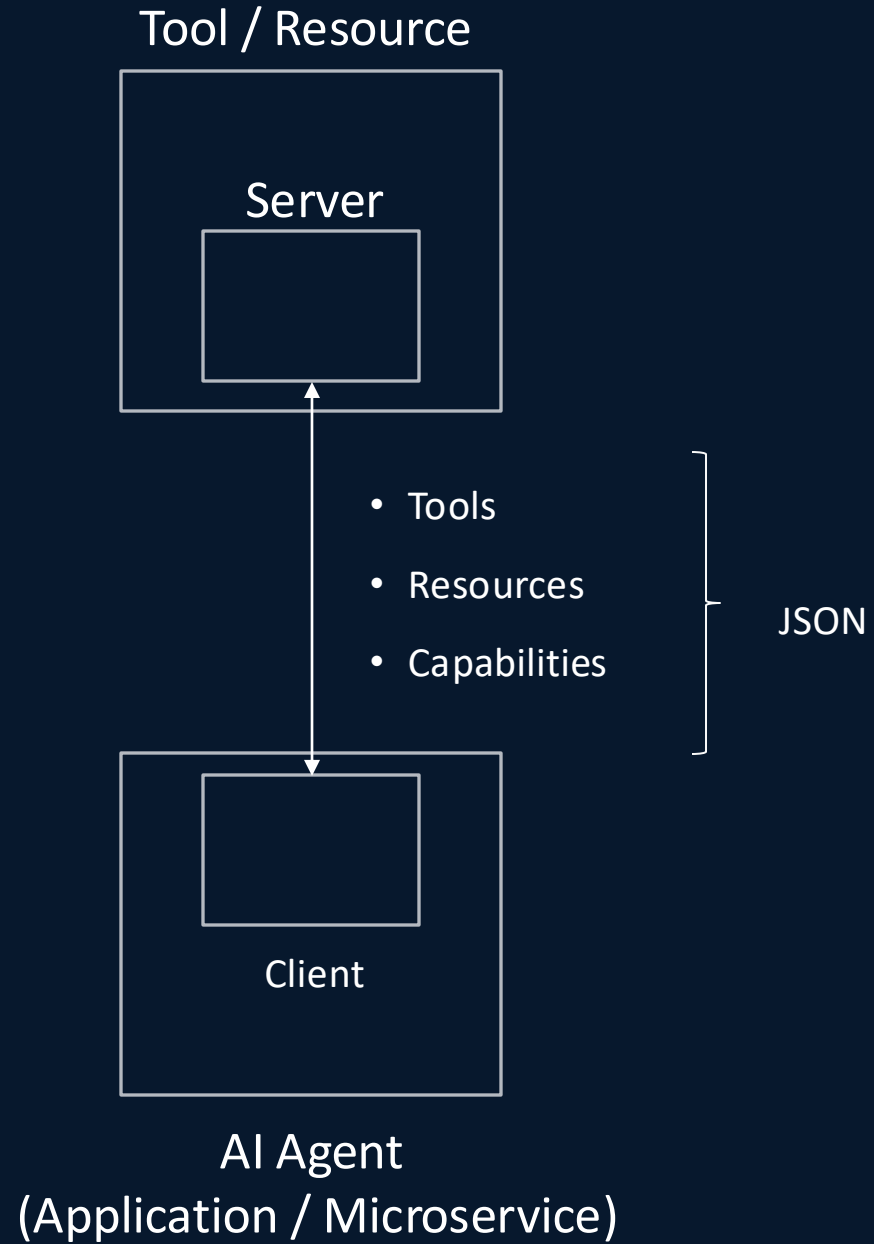
- Reduces fragmentation
- Easier to integrate models
- Shares context
- Ensures interoperability
- Ensures centralized policy enforcement and security

What it enables

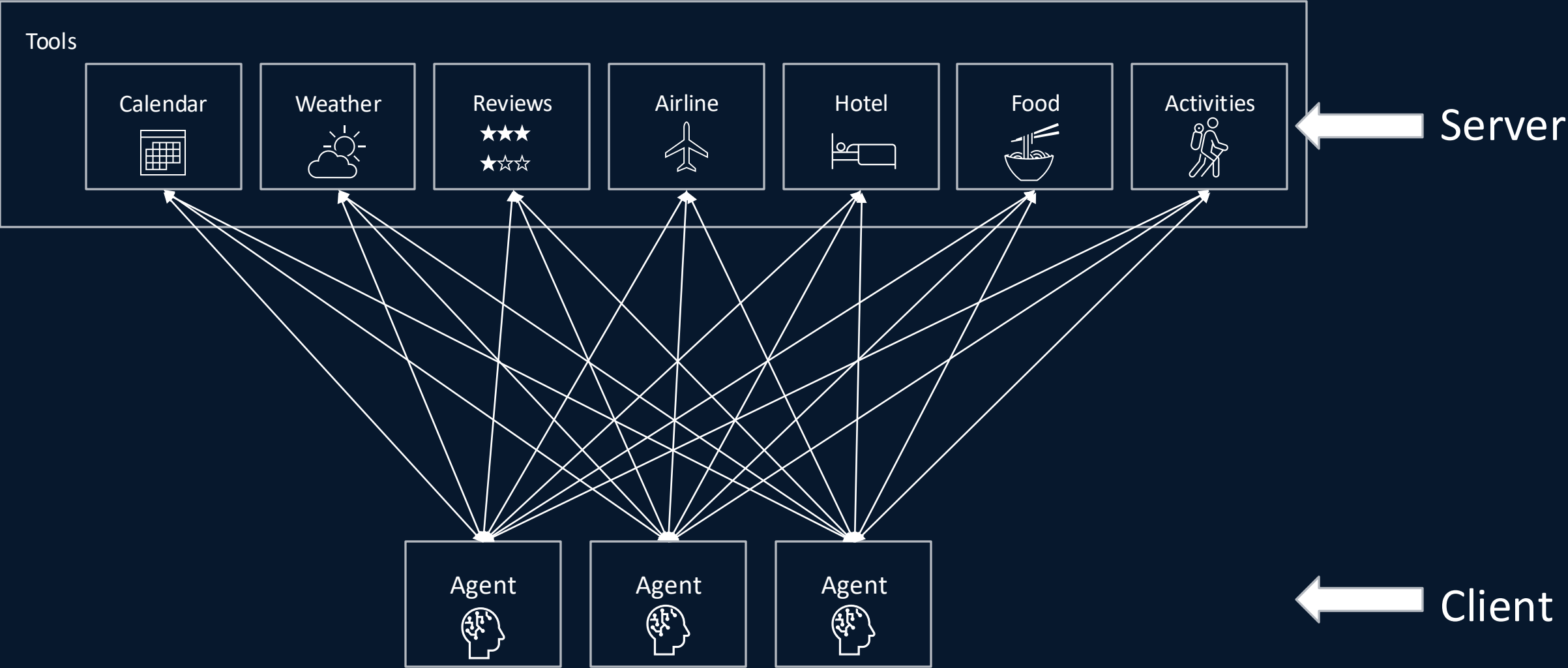
Seamlessly extends model capabilities

- Connects with tools, data sources, and systems
- Retrieving live data
- Executing actions
- Interoperability

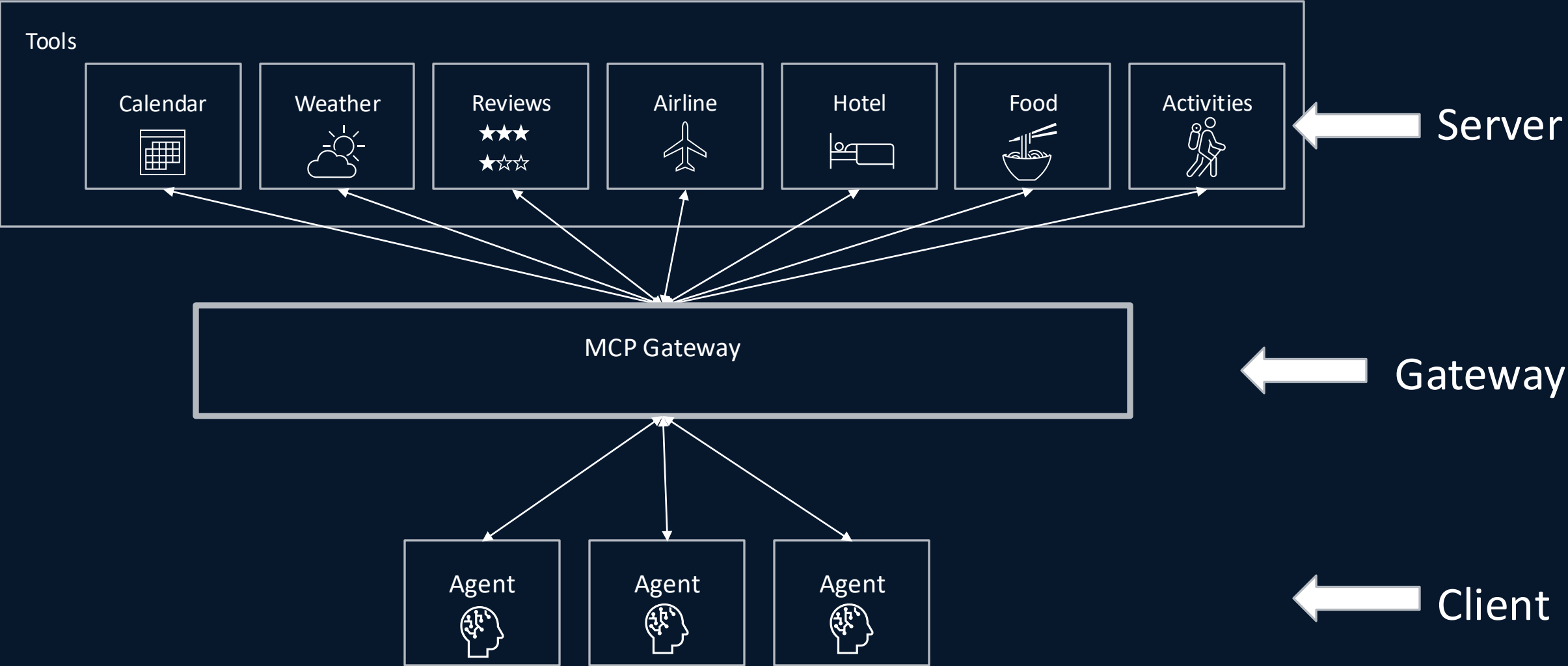
MCP Overview



Connecting AI Agents: Model Context Protocol (MCP)



Connecting AI Agents: Model Context Protocol (MCP)





 THE **LINUX** FOUNDATION

An open source collective for
inter-agent collaboration. A
project of the Linux Foundation

The AGNTCY is where we are building the
Internet of Agents to be: A diverse,
collaborative space to innovate, develop, and
maintain software components and services
for agentic workflows and multi-agent
software.

75+ collaborating organizations

Formative Members



ORACLE



AI Agents for Network Engineers

Relevant Network Components



Networking & Infrastructure

- Routers, Switches
- Firewalls
- WLC's and AP's
- Servers



Telemetry & Observability

- SIEM / Log Aggregators
- Flow and Telemetry
- Performance Monitoring
- Packet Captures



Configuration Control

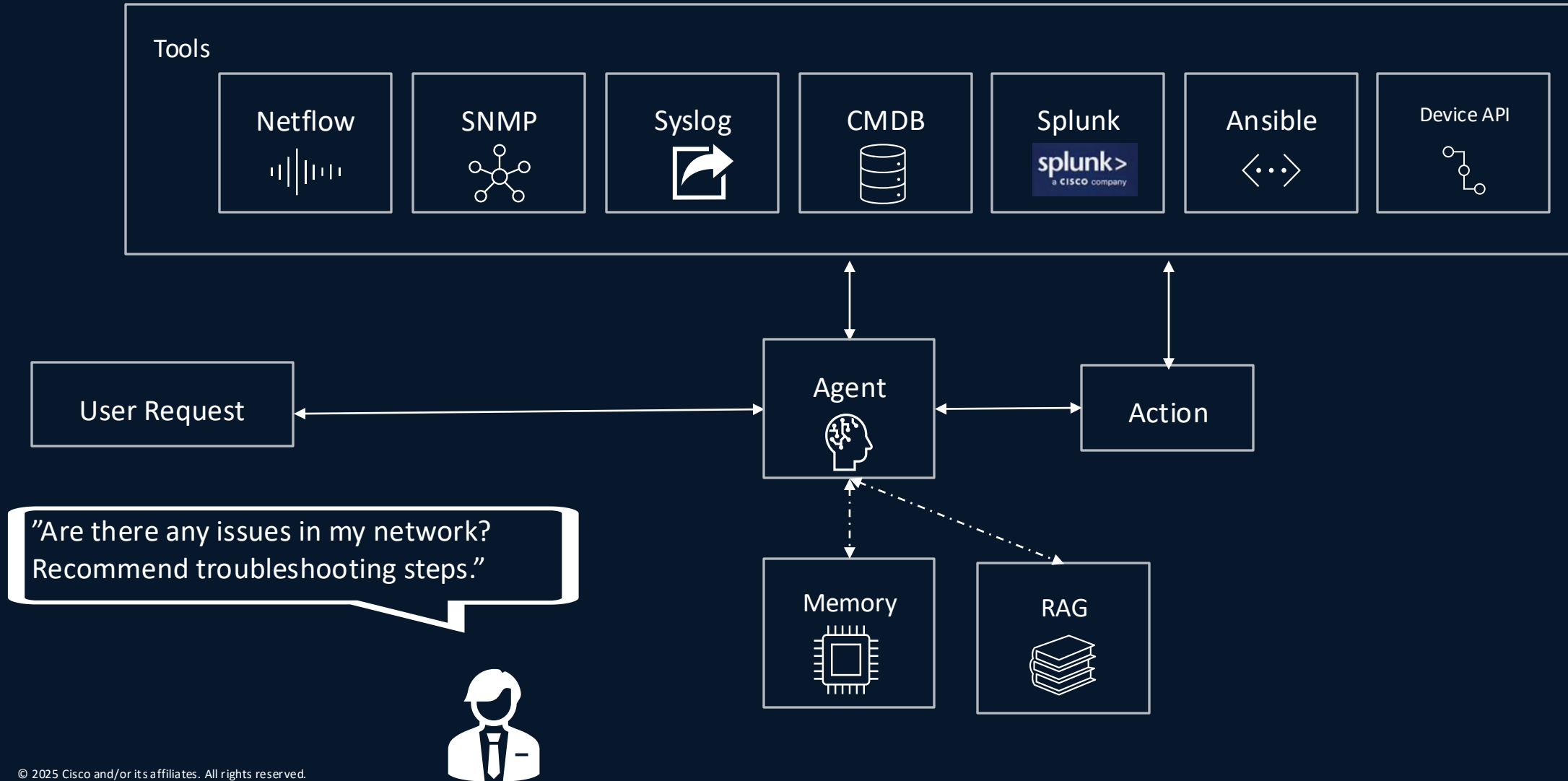
- Configuration Managers
- Orchestration
- Cloud API's



Security & Policy Enforcement

- Identity and Access
- NAC
- ZTNA
- SOAR / Security Automation

AI Agent Workflow Example for the Network



The Next Era: AgenticOps

AgenticOps

Cross-domain

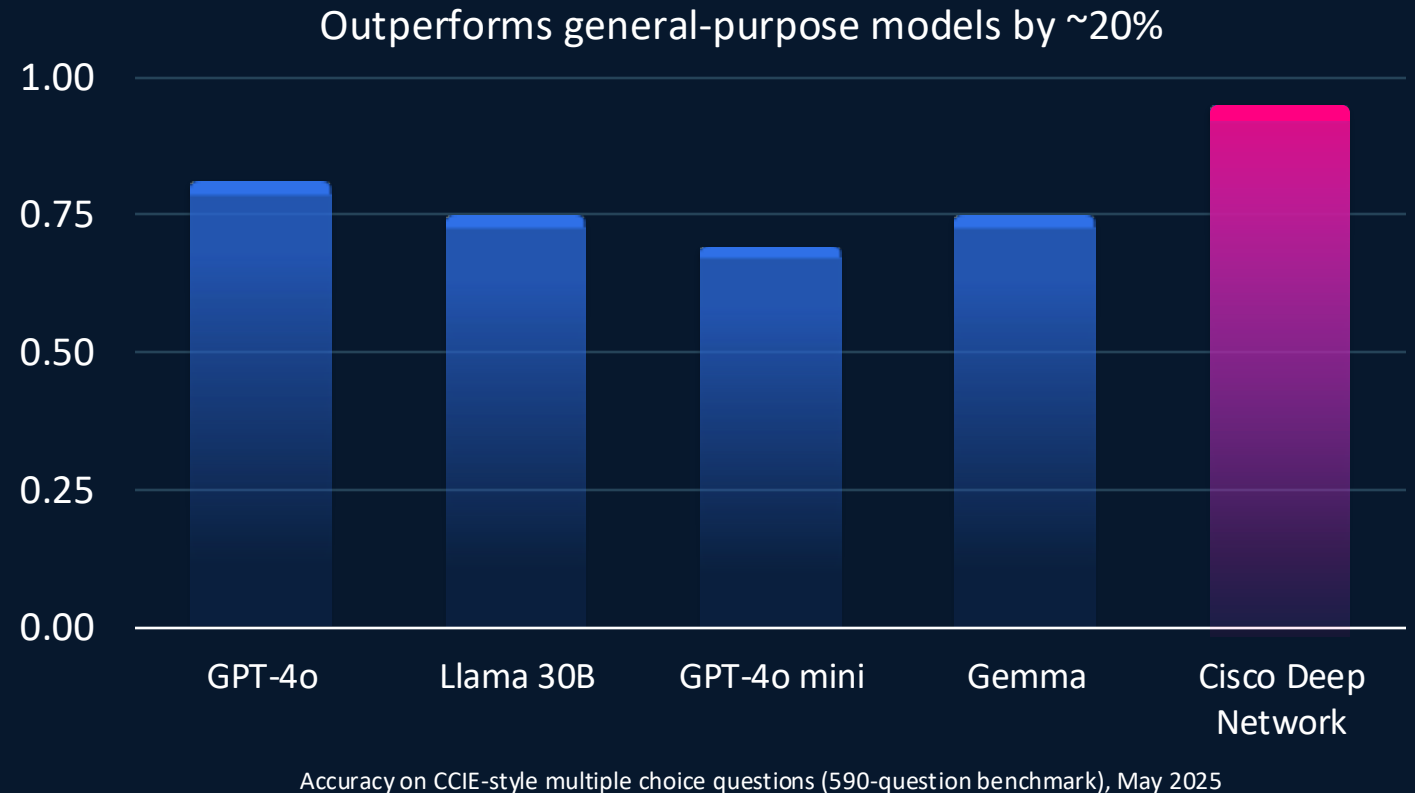
Multiplayer

Purpose-built models

Deep Network Model

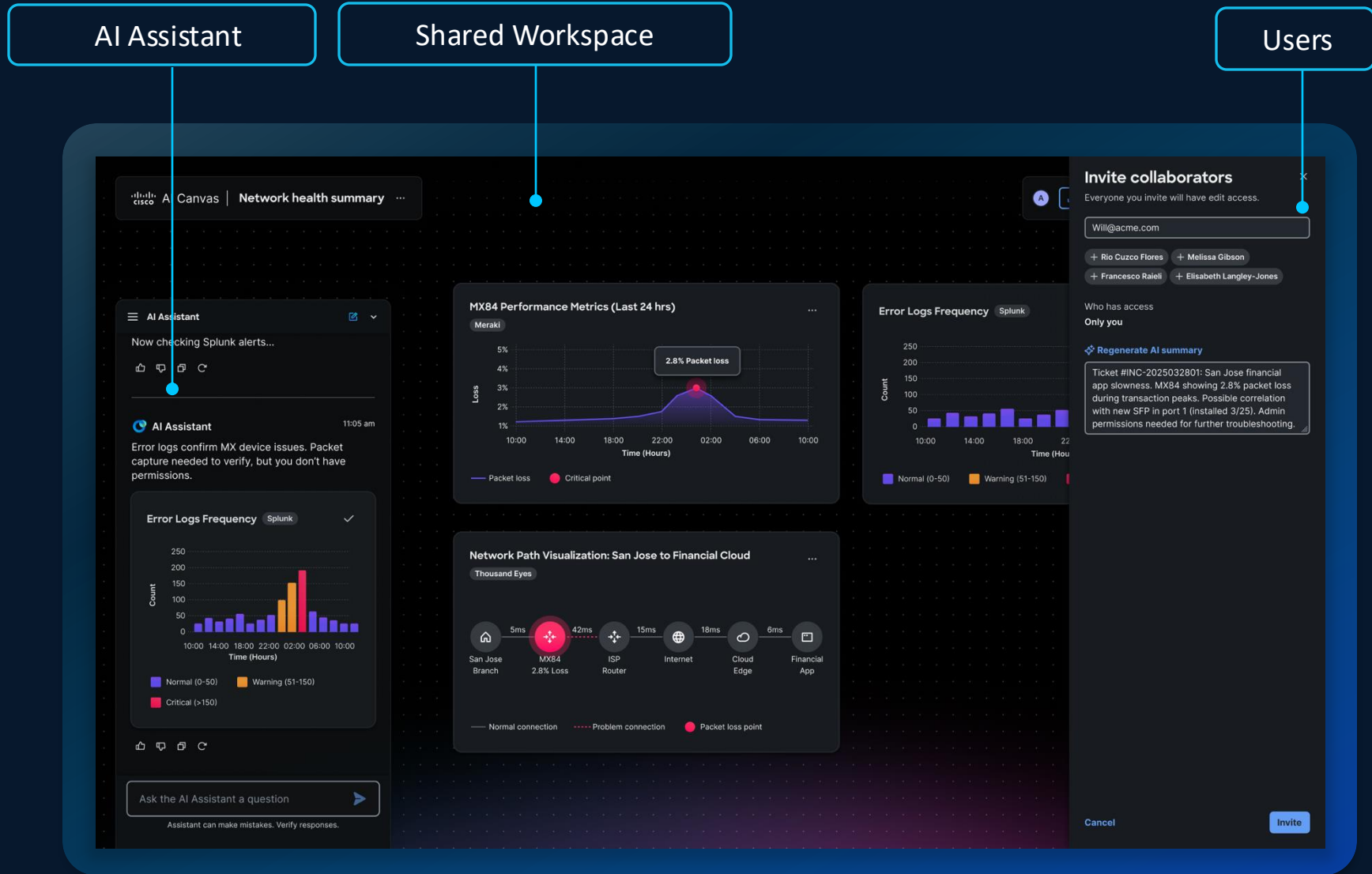
Purpose-built for networking,
expert accuracy

- More precise reasoning for troubleshooting, configuration, and automation
- Fine-tuned on 40+ years of expertise and expert-vetted for accuracy
- Evolves with live telemetry and real-world Cisco TAC and CX insights

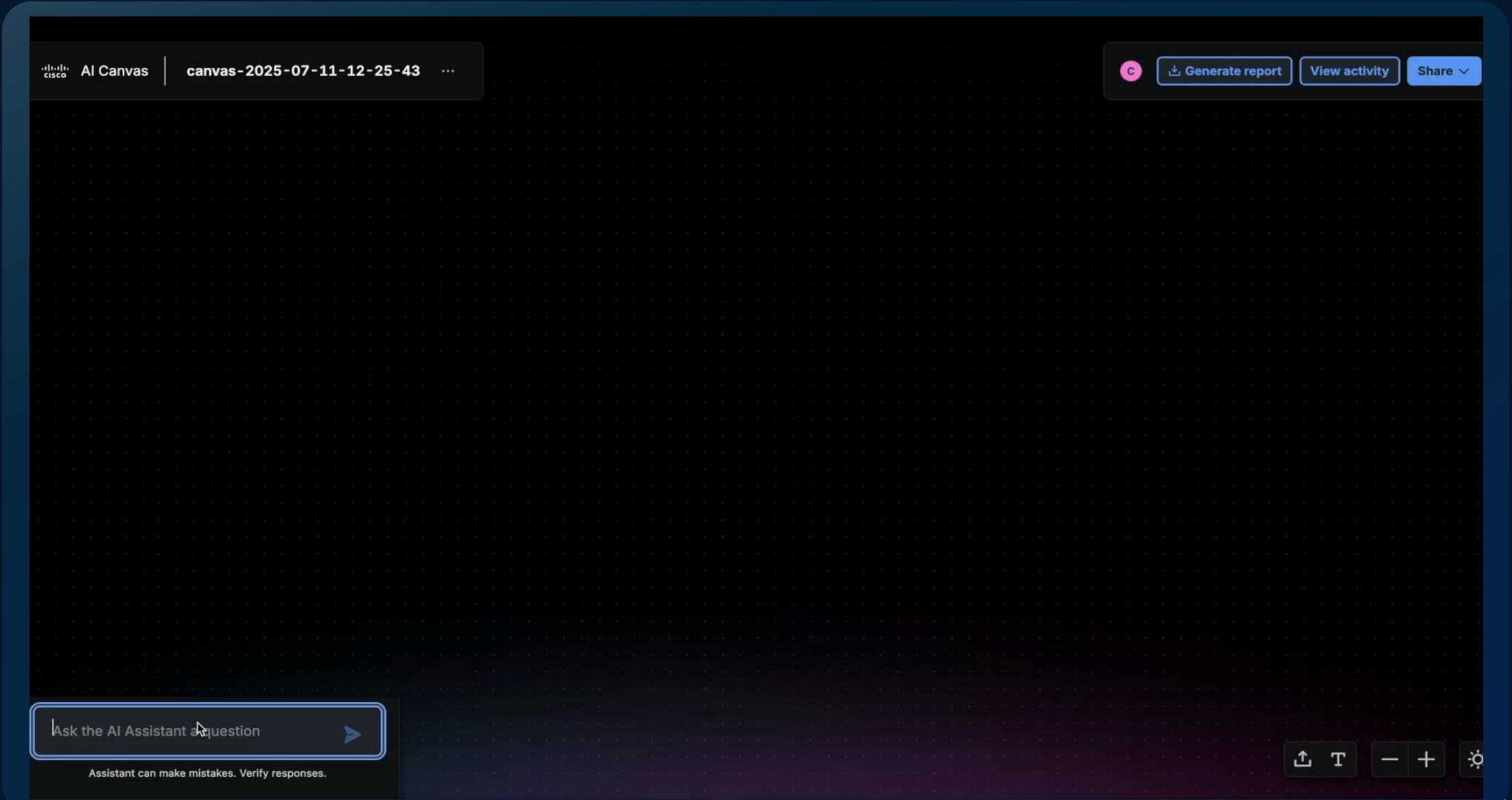


Introducing AI Canvas

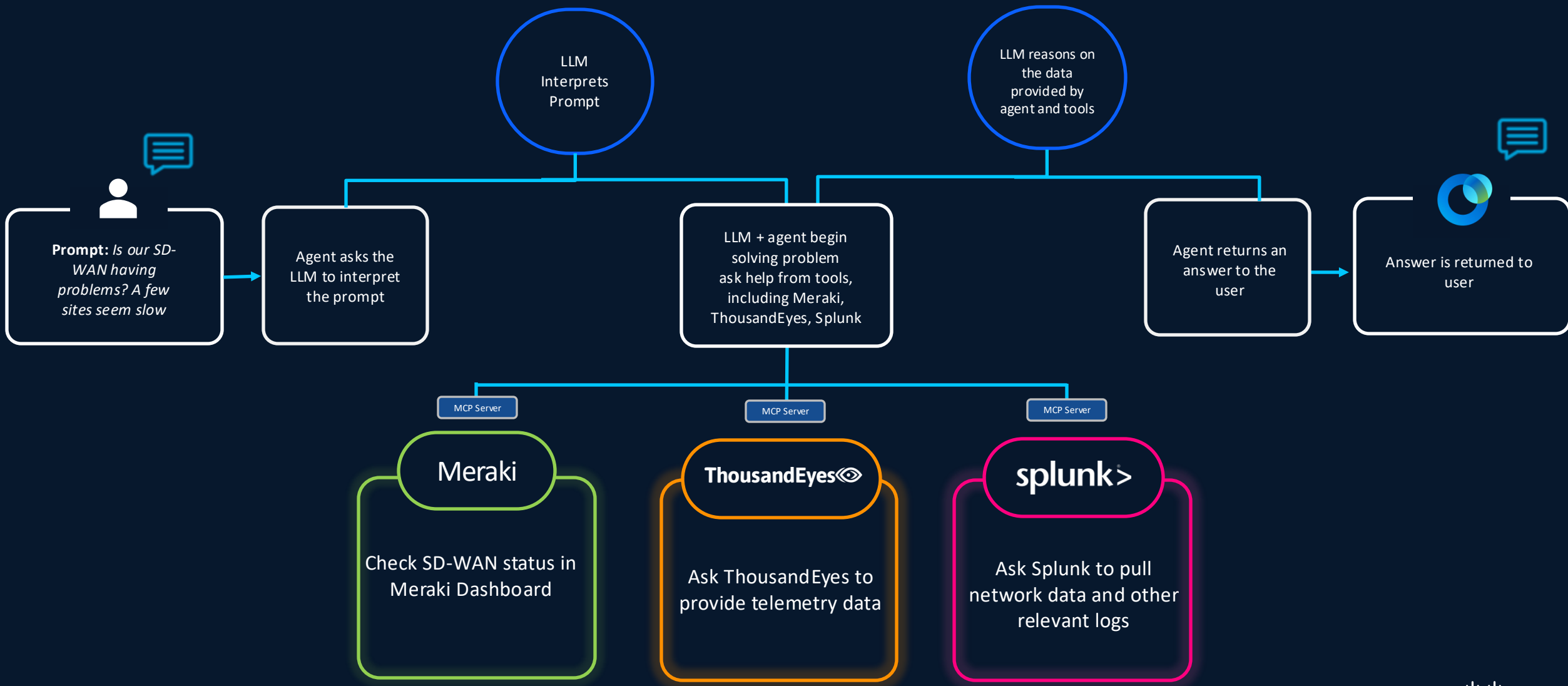
- Single canvas for cross domain troubleshooting
- Generative UI with reasoning built-in
- Keeps NetOps, SecOps, IT and execs on the same page



AI Canvas Demo



An Agentic Ops Example

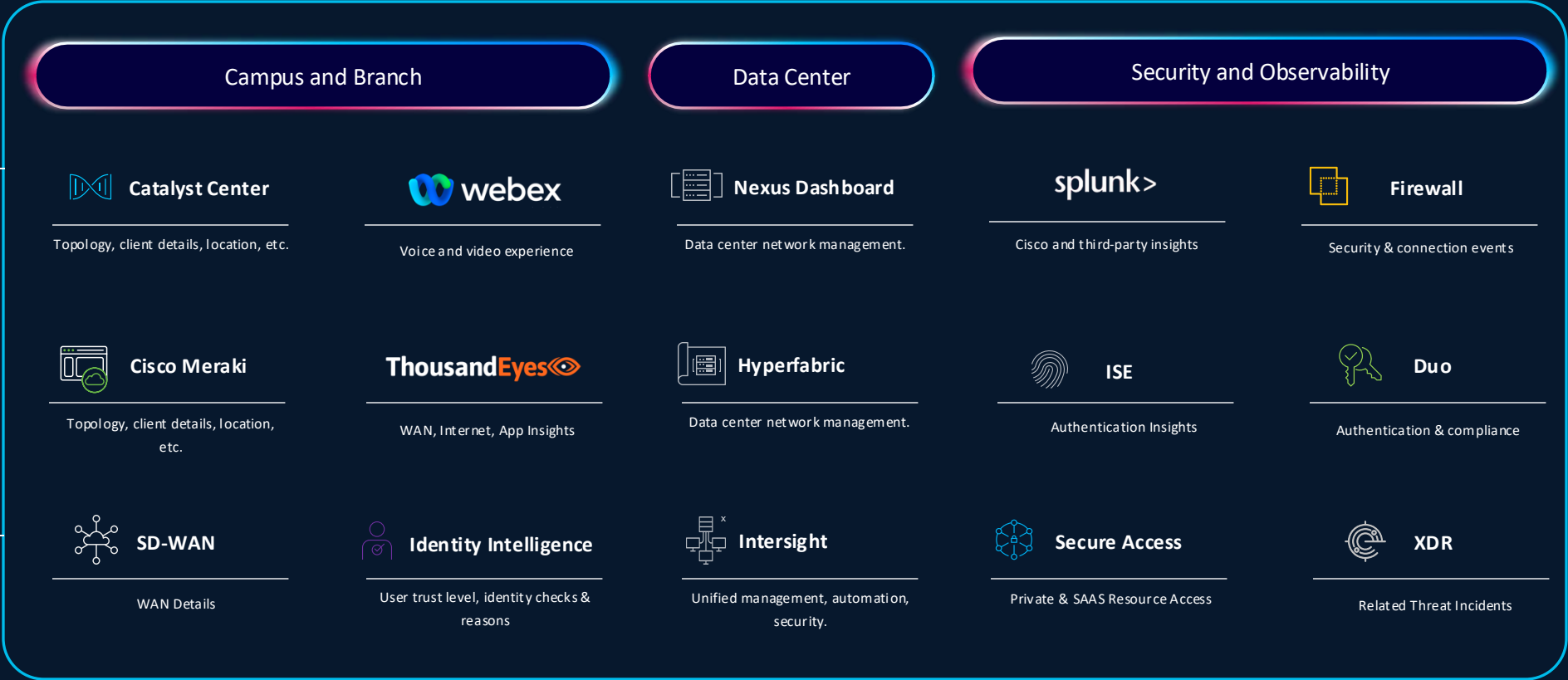
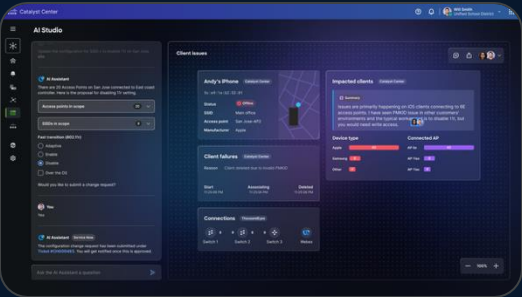


AI Canvas as the AgenticOps Platform

AI Assistant



AI Canvas



Thank you

