Developing Multi-Agent Systems with the Power of Semantic kernel

@VinothRajendran

Discussion Topics

- **Agent** – Introduction to AI Agents
- **Agent - Sample** – Example of a Single AI Agent
- **Multi-Agent** – Understanding Multi-Agent Systems
- **Multi-Agent - Sample** – Example of Multi-Agent Collaboration
- **Agent Framework** – Overview of AI Agent Frameworks
- **Semantic Kernel & Architecture** – Microsoft Semantic Kernel and Its Structure
- **Multi-Agent Demo** – Live Demonstration of Multi-Agent System

Vinoth Rajendran

A LITTLE ABOUT ME

Software Engineer-AI

12+ years of experience

Microsoft AI MVP

India's 2nd AI MVP

Azure AI Services

Microsoft , OpenAI , Bot , Etc.

Learn Microsoft AI

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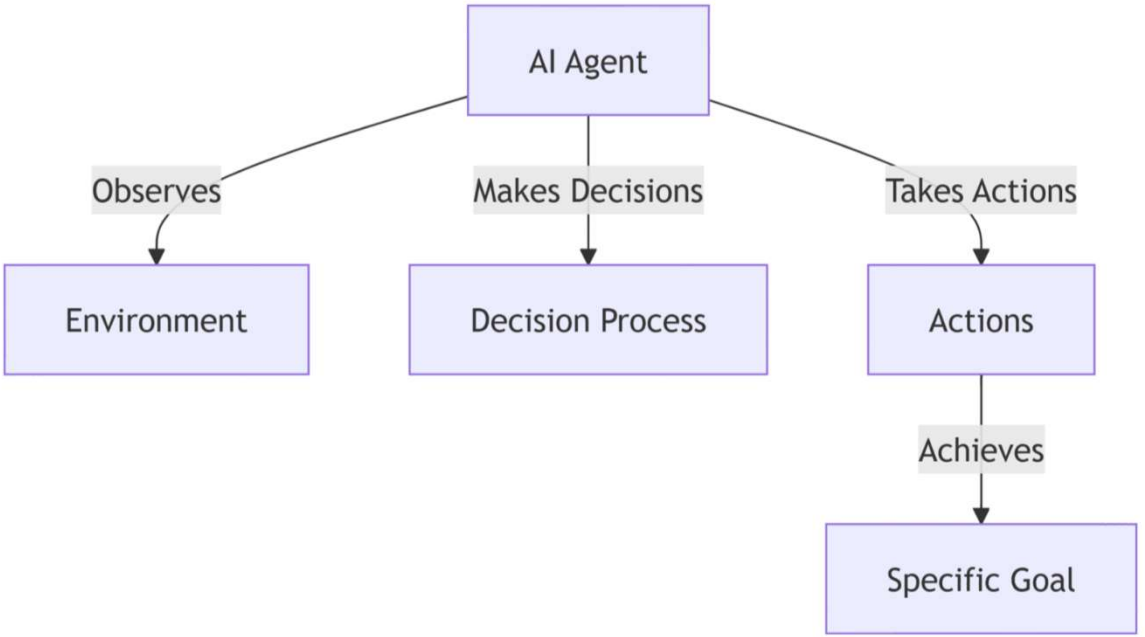
Open Source Package / My code samples

AI - Agent



An AI agent is a system that looks at its environment, makes choices, and takes actions to reach a goal.

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Agent: The Student

Environment:

- Study materials (books, online resources)
- Teachers, classroom setting
- Subjects to be learned (math, science, history, etc.)

Makes Choices:

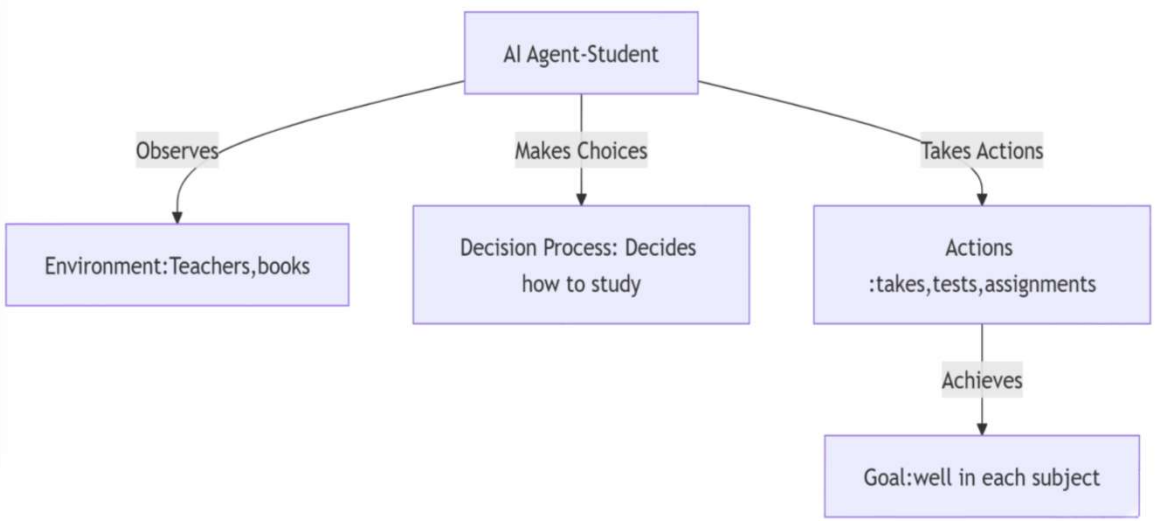
- Decides how to study (methods, resources)
- Chooses topics to focus on
- Selects the best learning strategies (e.g., textbook, videos, asking for help)

Takes Actions:

- Solves problems, writes assignments, takes tests
- Studies to master subjects

Goal:

- Learn and perform well in each subject



Multi-agent system

A multi-agent system is when several AI agents work together or interact to achieve a common goal, with each agent handling a different task or role.

A multi-agent system is a group of **agents** that each have specific **roles** . These agents **collaborate** by interacting with each other to achieve a common **goal** or solve a problem together.

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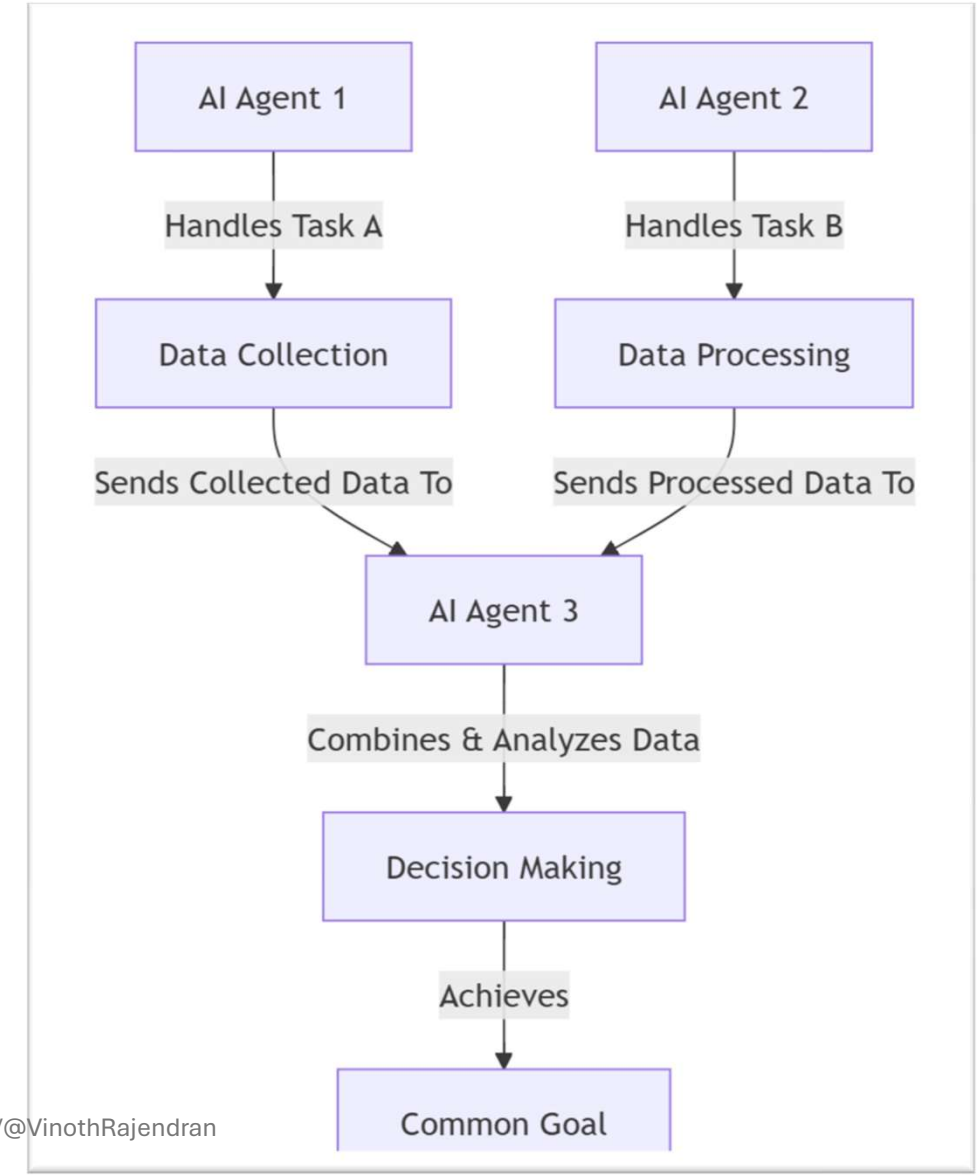


Multi-Agent System: The Teachers

Agents:

Multiple teachers, each specializing in a different subject (math, science, history, etc.).

Roles:

Each teacher is responsible for teaching their specific subject to students.

Teachers bring specialized knowledge to the classroom.

Collaboration:

Teachers work together to provide a comprehensive education to students.

This mirrors a multi-agent system in AI, where agents with different roles interact and collaborate.

Goal:

Achieve a common goal of educating the students through specialized knowledge and teamwork.

AI Agent Framework

Definition:

A set of tools and guidelines for designing, building, and managing intelligent agents.

Key Features:

Enables agents to observe their environment.

Helps agents make decisions based on the information.

Allows agents to take actions in response to their environment.

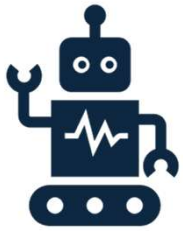
Purpose:

Simplifies the process of creating intelligent agents by providing the necessary tools and structure.

Agent: The Student

Environment:	Study materials (books, online resources) Teachers, classroom setting Subjects to be learned (math, science, history, etc.)
Makes Choices:	Decides how to study (methods, resources) Chooses topics to focus on Selects the best learning strategies (e.g., textbook, videos, asking for help)
Takes Actions:	Solves problems, writes assignments, takes tests Studies to master subjects
Goal:	Learn and perform well in each subject

AI Agent Frameworks



AutoGen

You need **multi-agent collaboration**, where AI agents work together.

Your focus is on **innovative AI-driven workflows** and **automation**

You require **flexibility, experimentation, and community-driven development**

Semantic Kernel

You need to **integrate LLMs with current software** and enterprise systems.

Your priority is **stability, reliability, and structured AI execution**.

Supports **multi-agent interaction** by enabling AI agents to communicate and coordinate tasks efficiently within enterprise applications.

Microsoft Semantic Kernel

Lightweight & Open-Source SDK – Helps developers integrate LLMs with C#, Python, and Java.

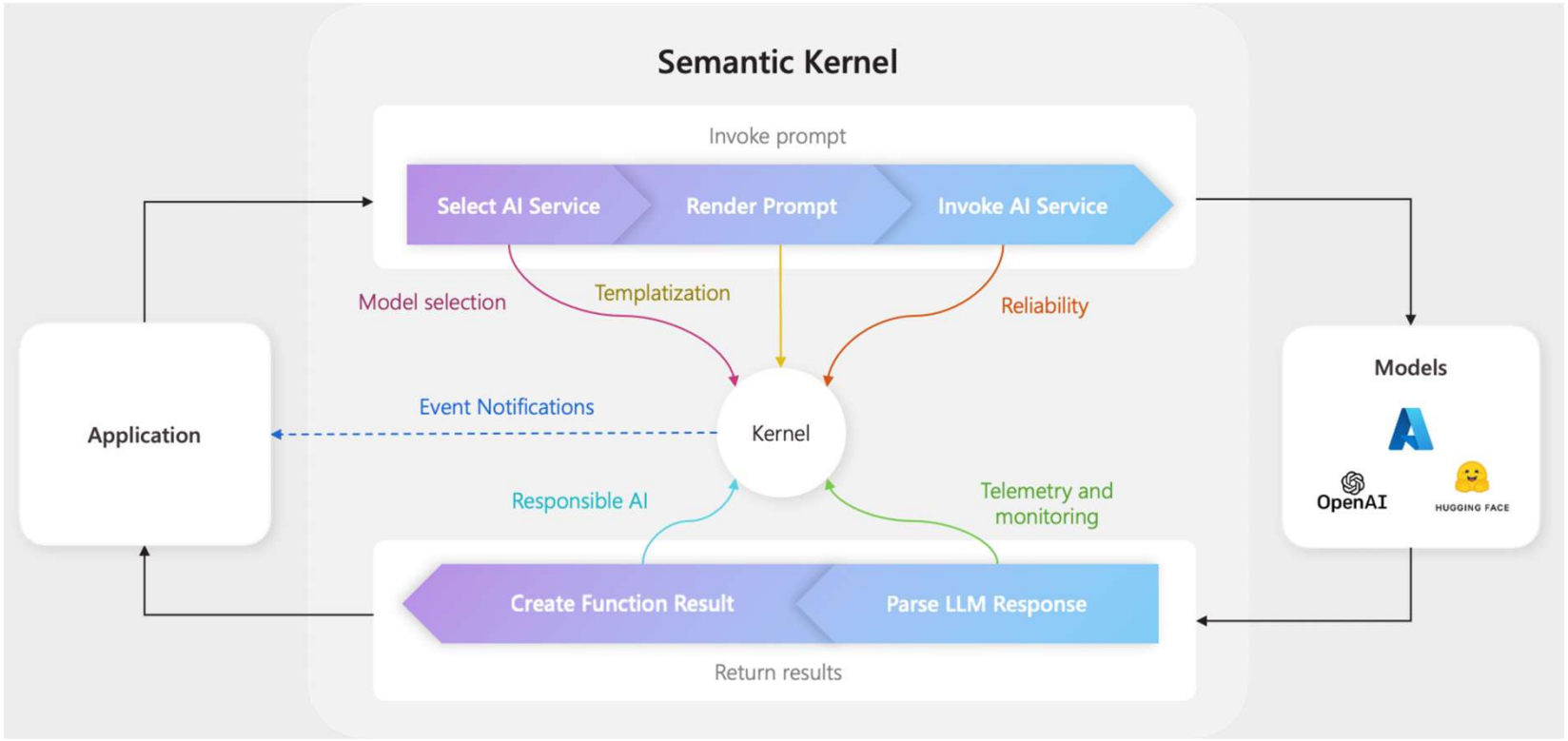
Bridges LLMs with Code – Acts as a bridge, allowing applications to harness LLM power.

Orchestrates AI Functionalities – Uses **plugins** to combine and manage AI tasks.

Automates Tasks – Merges LLMs with traditional code to automate different processes.

Builds AI Agents – Helps create AI agents that can perform complex tasks

kernel is at center of *everything*



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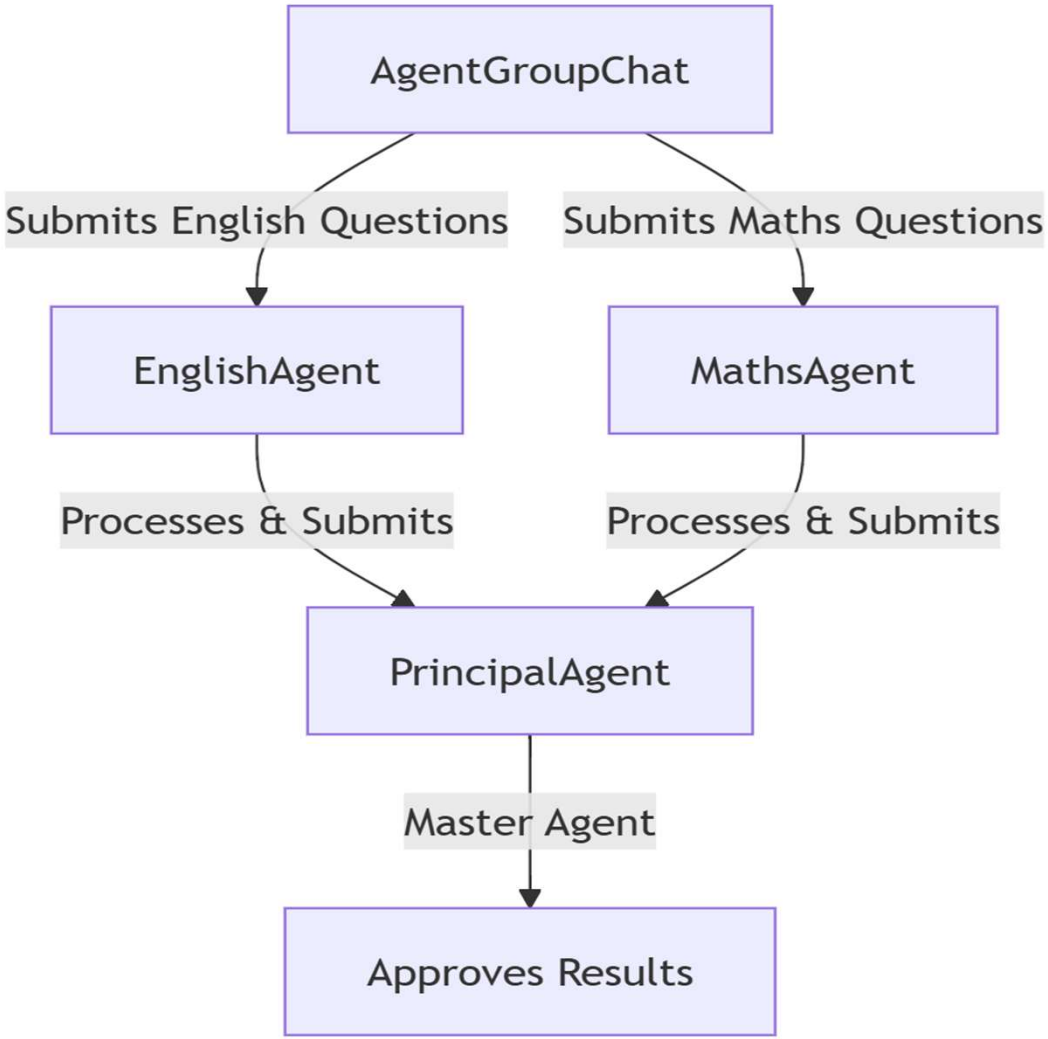
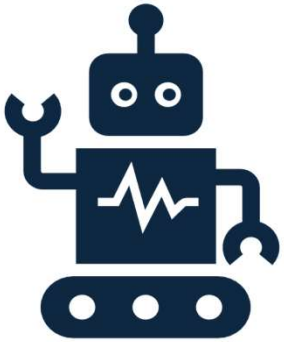
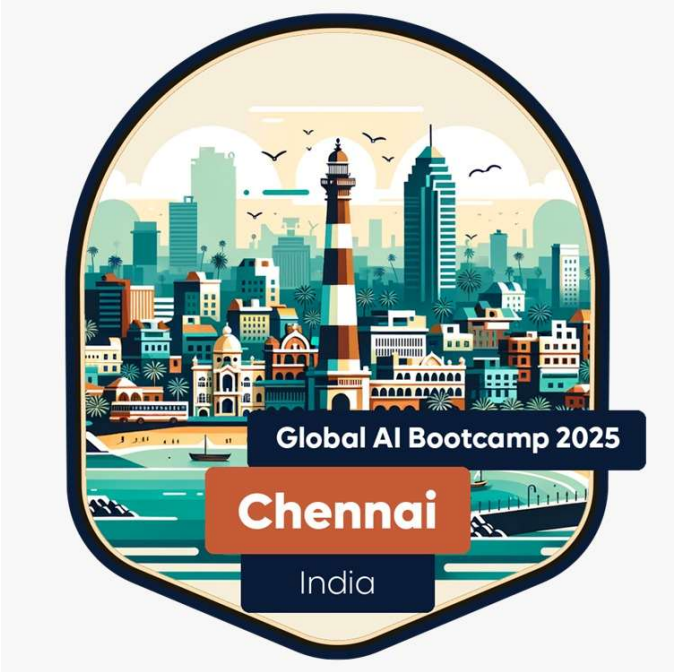
SK : Multi-Agent - Example





Demo



Thank you

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