

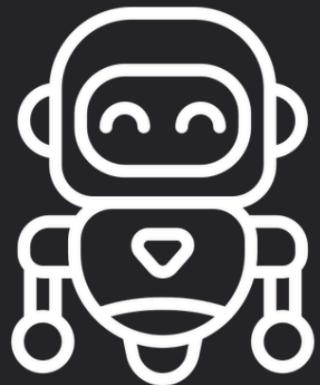
Single-Agent vs. Multi-Agent Systems

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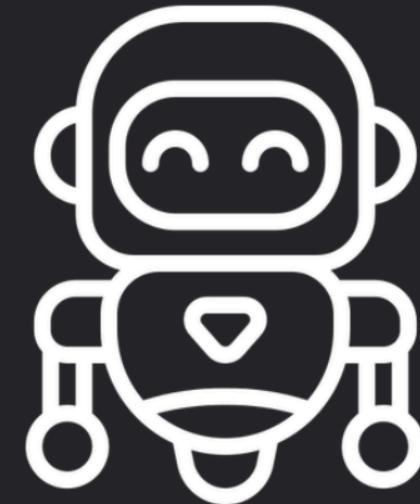
Single Agent vs. Multi Agent



Single-Agent Systems

Definition

- One agent operating independently
- Example: Stand-alone decision-making bots



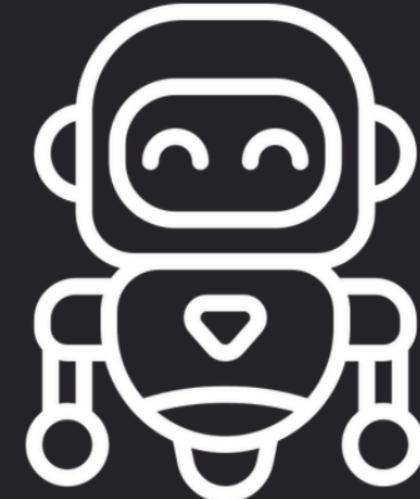
Single-Agent Systems

Advantages

- Simpler and easier to manage.

Limitations

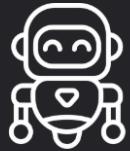
- Cannot collaborate
- Cannot share knowledge with other agents or get information from multiple sources



Multi-Agent Systems

Definition

- Multiple agents working cooperatively or competitively
- **Core Idea:** Division of tasks and communication among agents
- **Example:** A hotel support system where one agent handles reservations, another handles complaints, and another provides recommendations



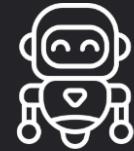
Multi-Agent Systems

Advantages

- More efficient, can handle complex workflows

Limitations

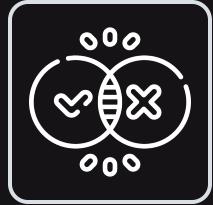
- Requires coordination and communication between agents



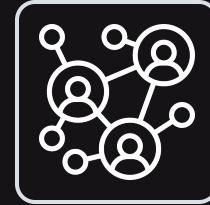
Communication and Coordination is basically how agents share information, negotiate, or split responsibilities

Communication and Coordination

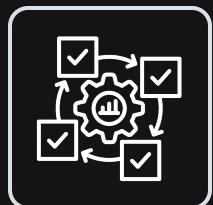
Challenges



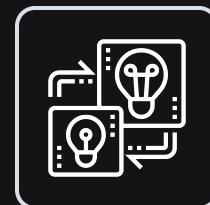
Conflicts



Avoiding miscoordination

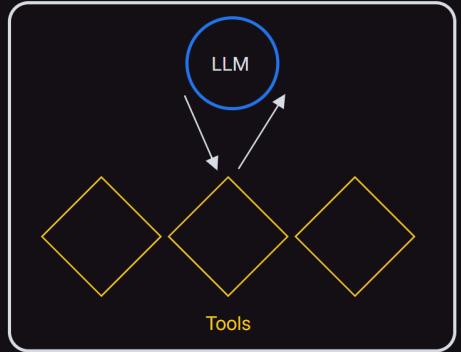


Ensuring consistency

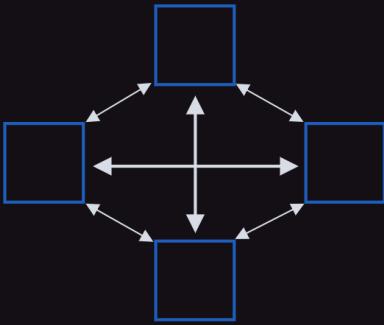


Scalability and system complexity

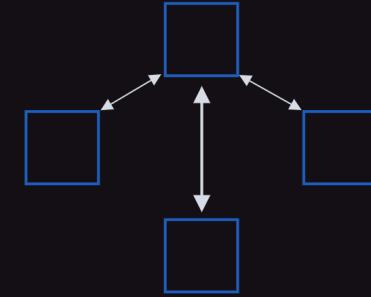
MAS Architecture Patterns



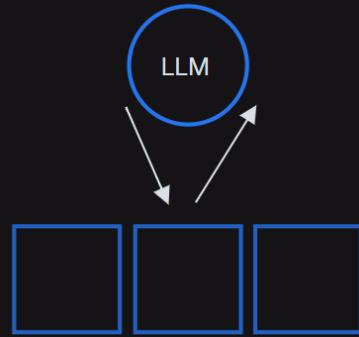
Single Agent



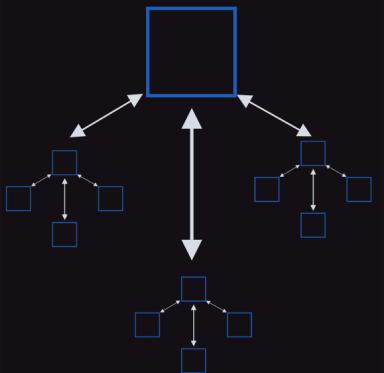
Network



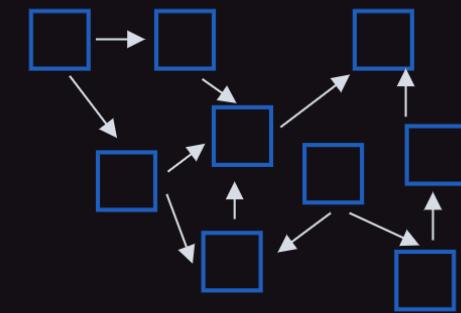
Supervisor



Supervisor (as tools)

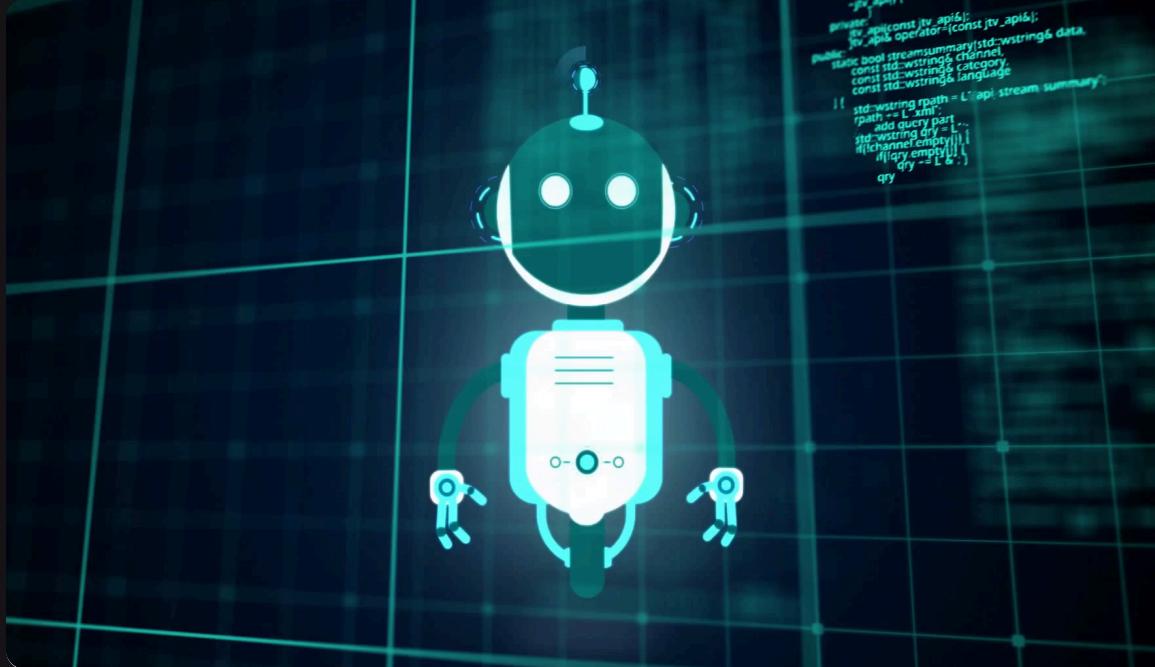


Hierarchical



Custom

Applications of Multi-Agent Systems



Personal Assistants



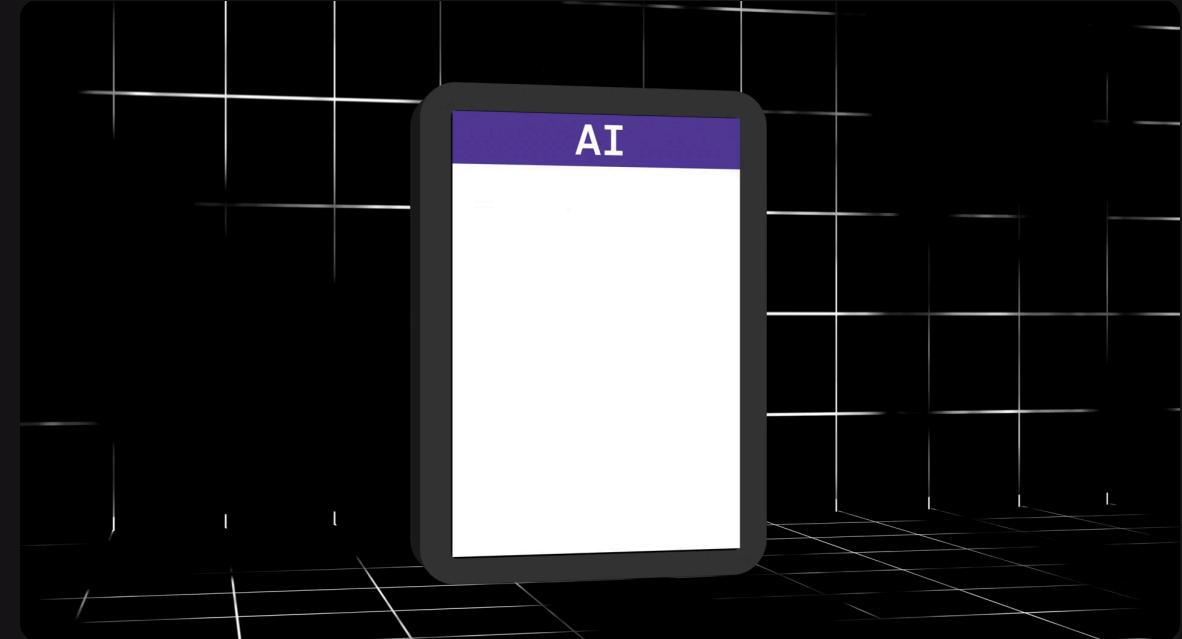
Smart Homes

AI agents managing lighting, security, temperature

Applications of Multi-Agent Systems



Autonomous vehicle fleets
Coordinating traffic flow



AI-driven customer support (full, not only first level)

Summary & Next Steps

- **Single-Agent vs. Multi-Agent Systems:** Key differences and advantages.
- **Next Step:** Implementing a multi-agent system for the Hotel Support AI Project.

Thanks