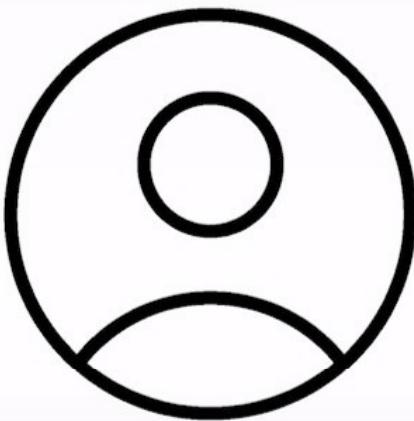


Framework & Platform

- Breaks all these concepts into simple structures
- Provides a pattern to put these systems together
- Provides tools / skills ready to be used by agents
- Gives you a model to build custom tools for agents
- Offers a platform for bringing these agents into production

What we will cover in this course

- Overview
 - Research & write a technical article
- Multi Agents core concepts
 - Customer support AI Agents
- Using Tools at Scale
 - Customer outreach campaign
- Tasks and Processes
 - Event planning
- Agentic Collaboration
 - Financial analysis
- Build a complete Crew
 - Tailor-made resumes
- Next Steps



Role Playing

Focus

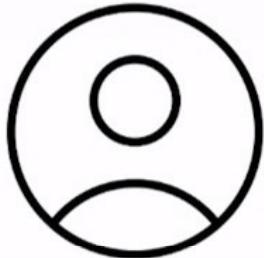
Tools

Cooperation

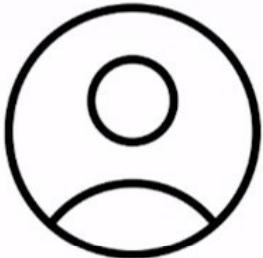
Guardrails

Memory

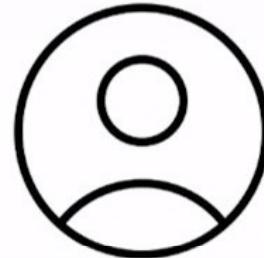
Agents



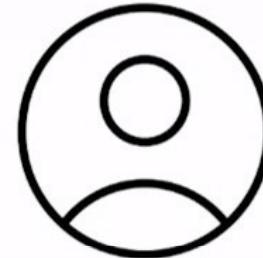
Tech Job
Researcher



Personal Profiler
for Engineers



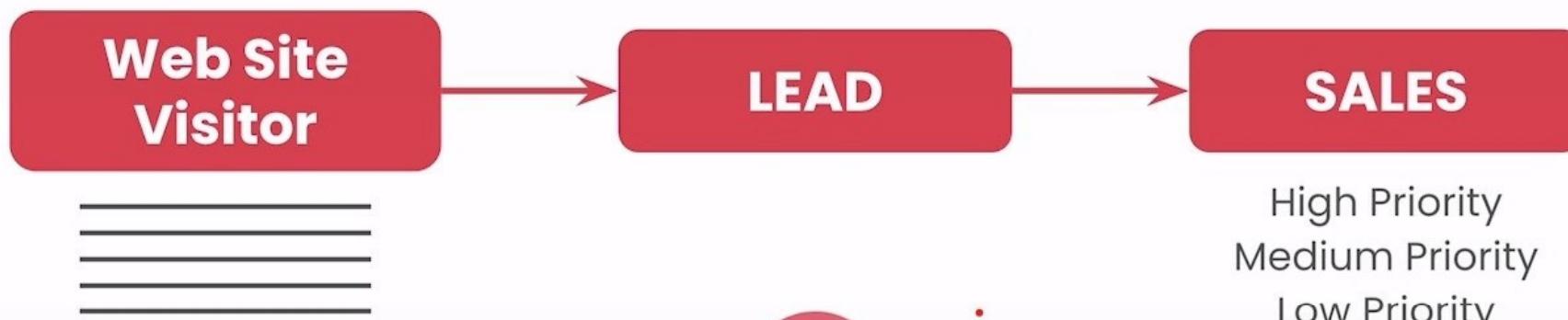
Resume Strategist
for Engineers



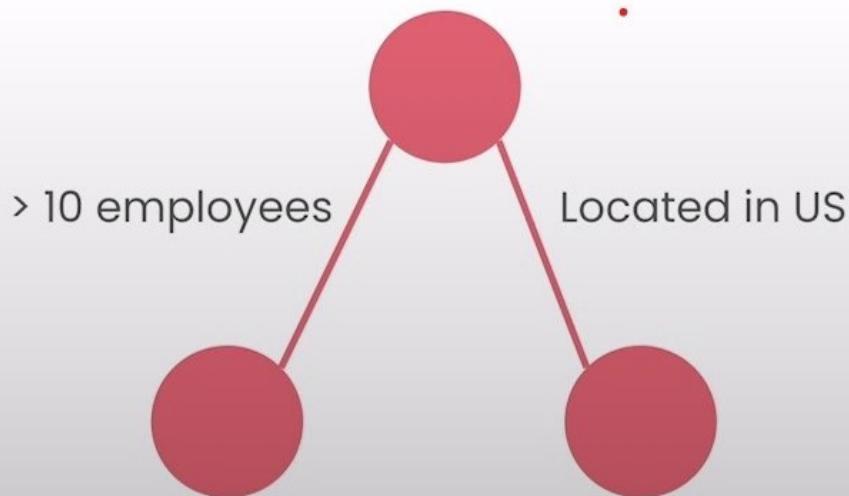
Engineering
Interview Preparer

- Search the internet
- Read websites
- Read resume
- Perform RAG (Retrieval Augmented Generation) on resume

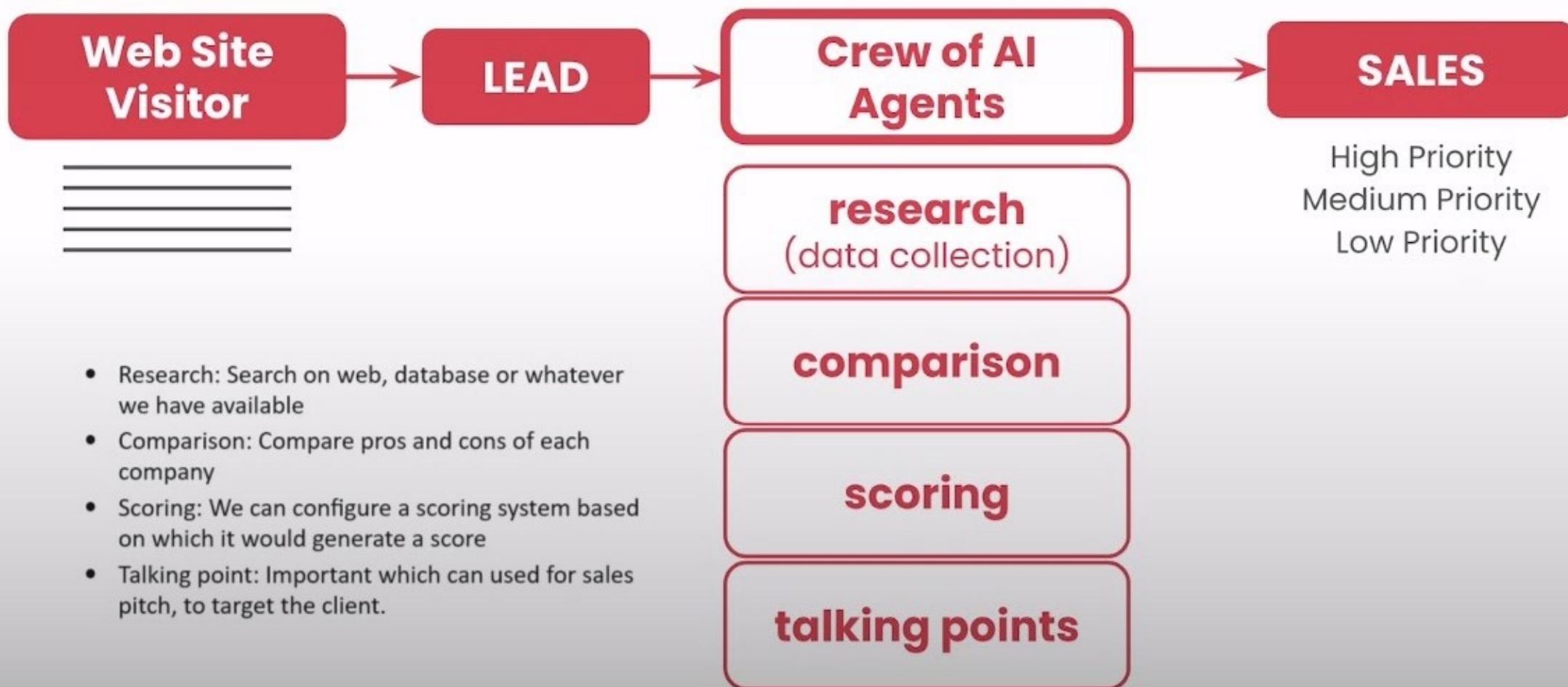
Data Collection and Analysis



This is the regular process where we write conditions, etc based on rules defined by us.

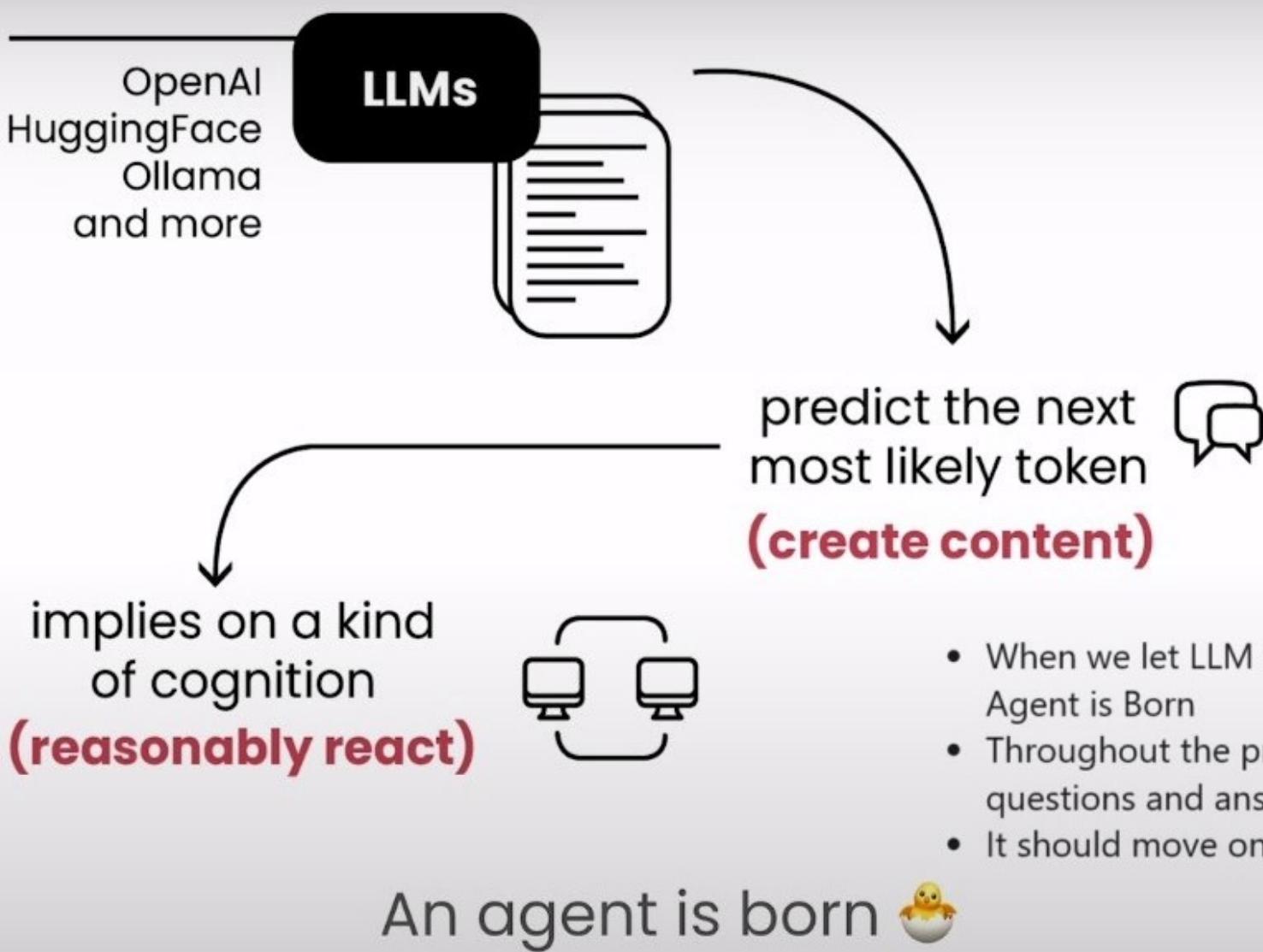


Data Collection and Analysis

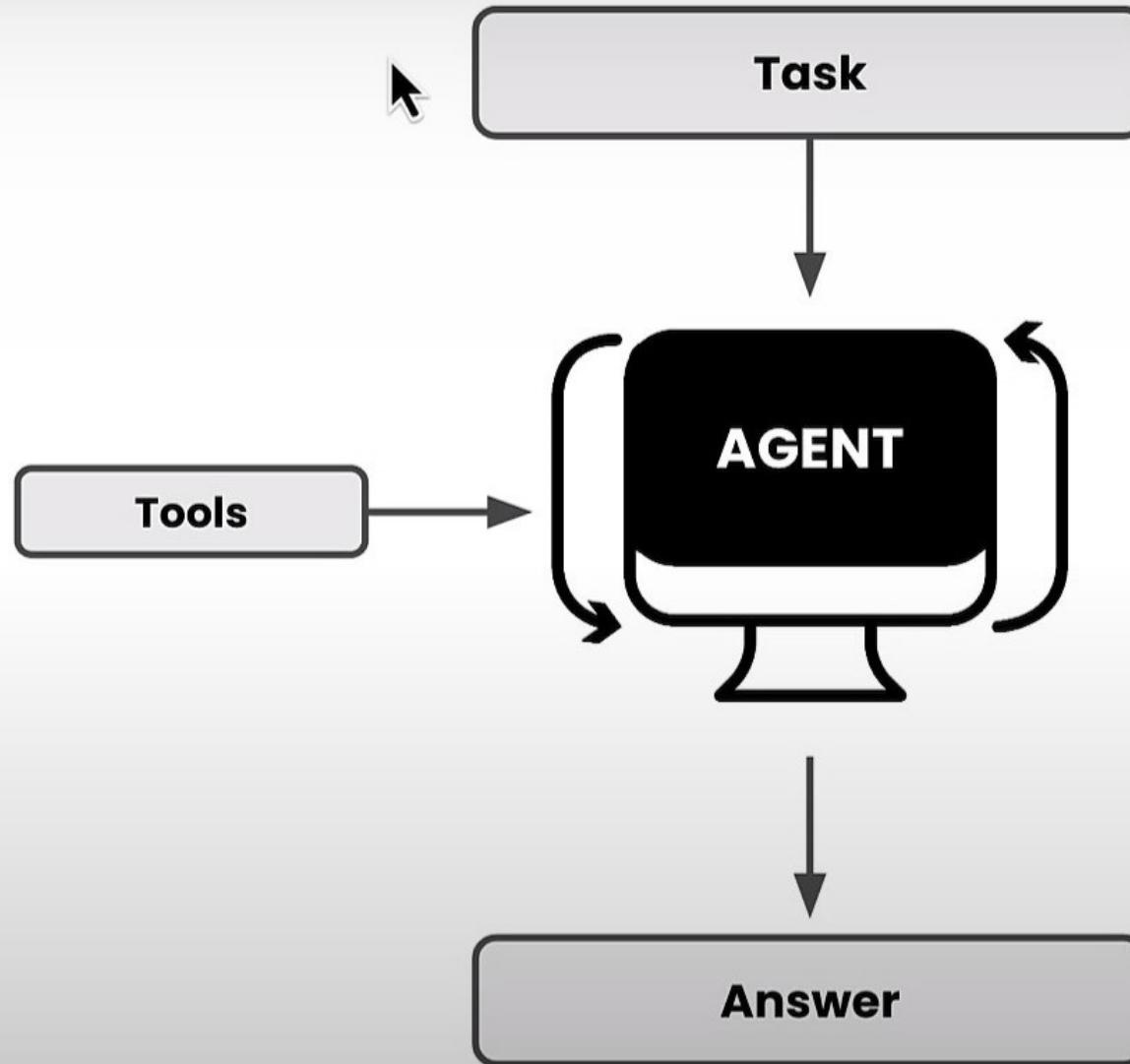


Fuzzy inputs, transformations, outputs

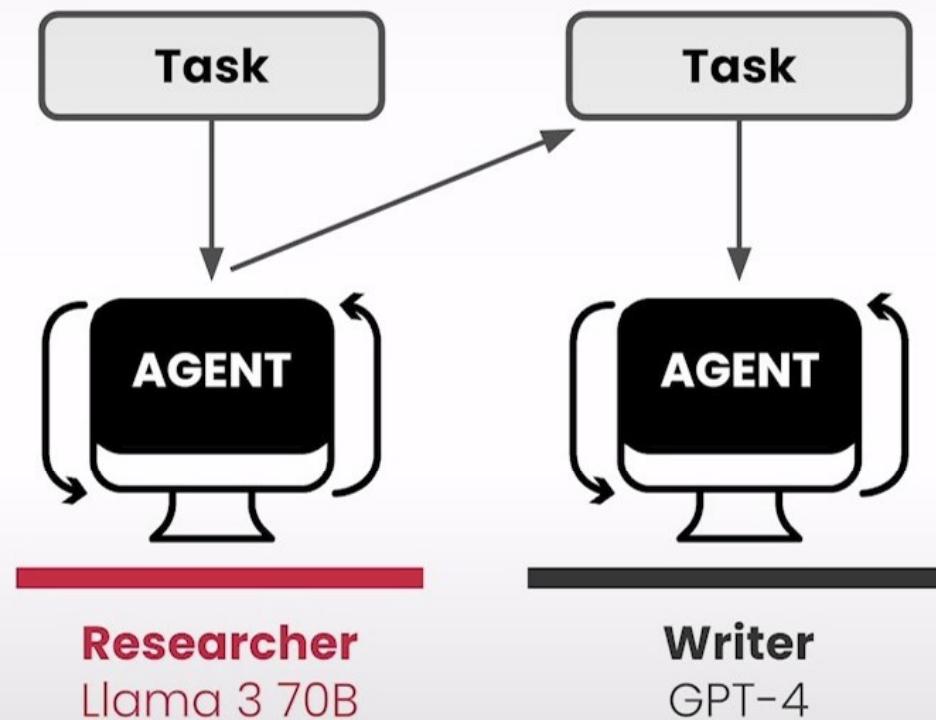
	Traditional Software Development	AI Software Development
Inputs	<ul style="list-style-type: none">- text (string) with defined set ("happy", "calm")- numeric (int, float)	Fuzzy inputs: Open-ended text <ul style="list-style-type: none">- Tabular data- markdown- Text- math operation
Transformations	<ul style="list-style-type: none">- Math calculation (+ - ÷ ×)- f"Hello {first_name}, how are you?"- if, elif, else- for/while loops	Fuzzy transformations <ul style="list-style-type: none">- Extract list of key words- Rewrite as a paragraph- Answer a question- Brainstorm new ideas- Perform logic/math reasoning
Outputs	<ul style="list-style-type: none">- text (string) with defined set ("Positive", "Neutral")- numeric (int, float),	Fuzzy outputs: text <ul style="list-style-type: none">- Paragraph- Number(s)- JSON- Markdown
Notes	<ul style="list-style-type: none">- Can be replicated	<ul style="list-style-type: none">- Probabilistic: can be different every time



- When we let LLM to insert some Question an Agent is Born
- Throughout the process it able to ask questions and answer itself.
- It should move on and get better by itself.



- When we let LLM to insert some Question an Agent is Born
- Throughout the process it able to ask questions and answer itself.
- It should move on and get better by itself.
- Advantage is it has ability use tools



Initial Building Blocks

Agents

Tasks

Crews



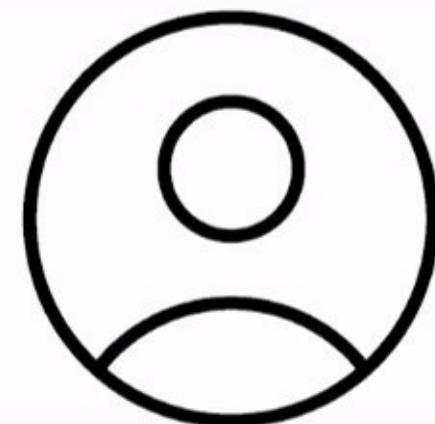


- Agents perform better when role-playing
- You should focus on goals and expectations
- One Agent can do multiple tasks
- Tasks and Agents should be granular
- Tasks can be executed in different ways
- It's pretty easy to create multi-agents with crewAI

Refer Notebook as well which would help you understand better

- Role Playing
 - Giving in detail and clear information
- Focus
 - Shouldn't rely on 1 agent to do better.
 - Have multi agents that work better together.
- Tools
 - Using lot of tools for their agents might get messy and confusing.
 - Provide them with key tools to get the job done.
- Cooperation
 - Ability to cooperation among each other makes it a great agent.
 - Collaboration

These 6 features makes an agent great



- Guardrails
 - Don't want agent to struck on a loop or take long time to respond.
 - Prevent Hallucinations.
 - To avoid those cases CrewAI have implement series of guardrails that prevents agents from derailing.
- Memory
 - Memory is the ability of your agent to remember what is has done.
 - Use memory to enable new executions.
 - Ability to recollect the past.
 - Learn from past knowledge and apply it into future executions.

Role Playing

Focus

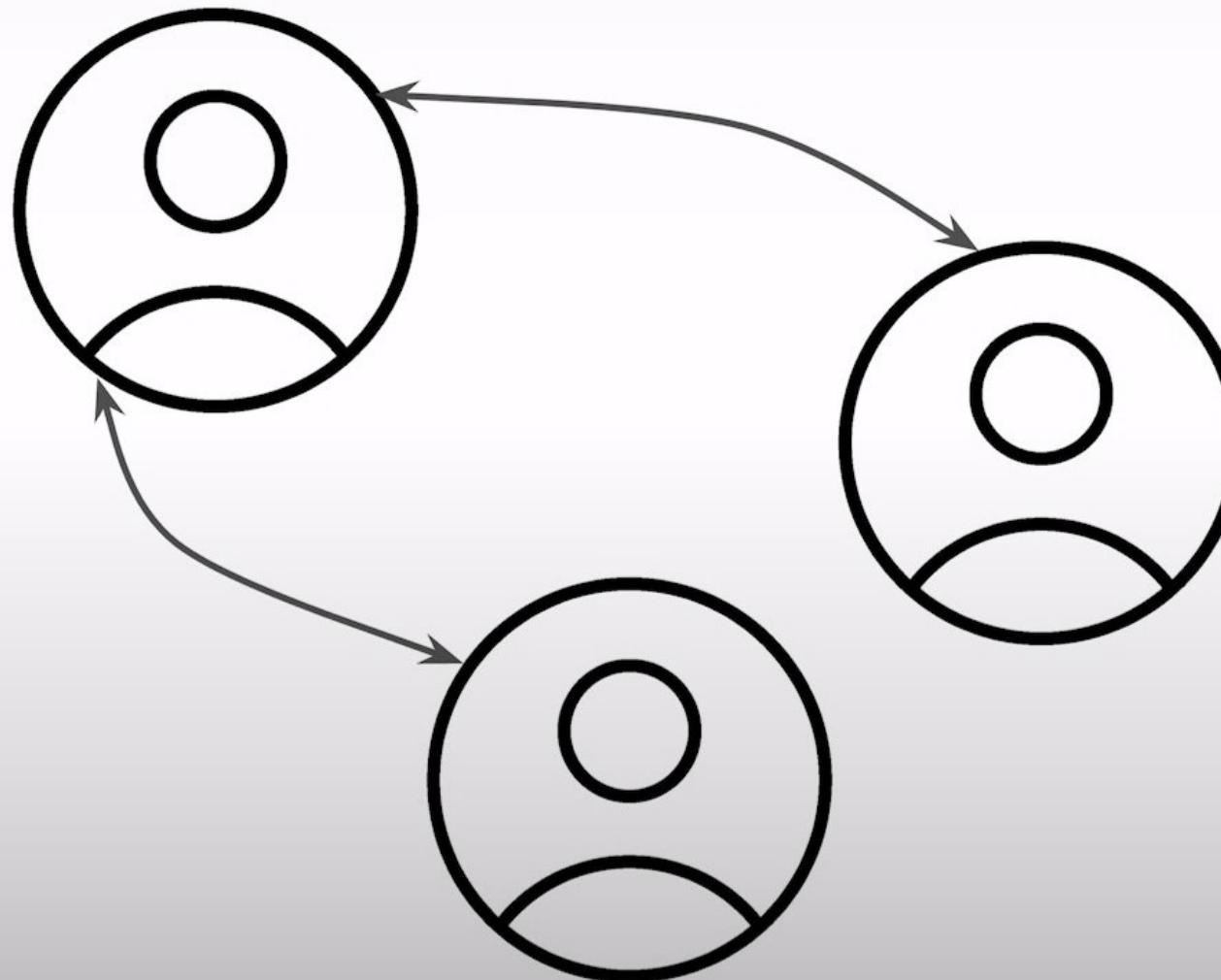
Tools

Cooperation

Guardrails

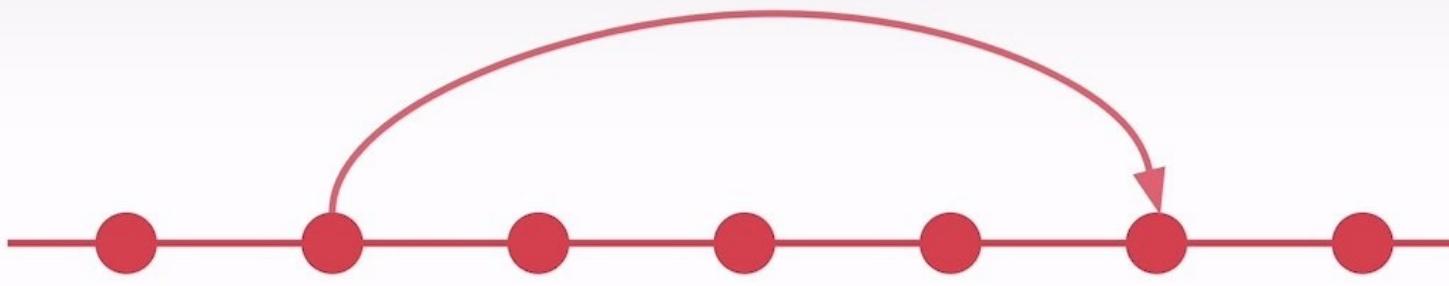
Memory

Collaboration

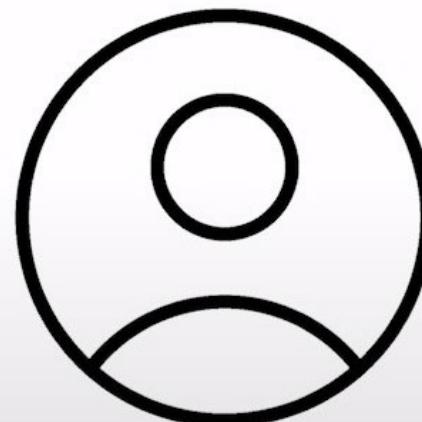


- Take feedback
- Delegate tasks

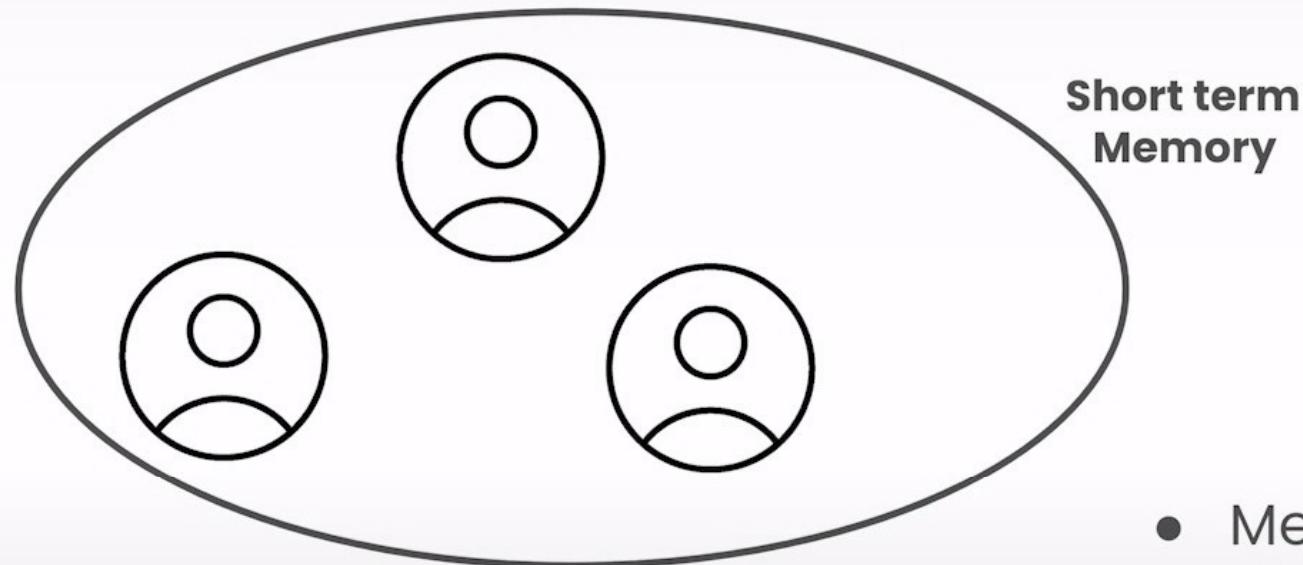
Memory



- Memory
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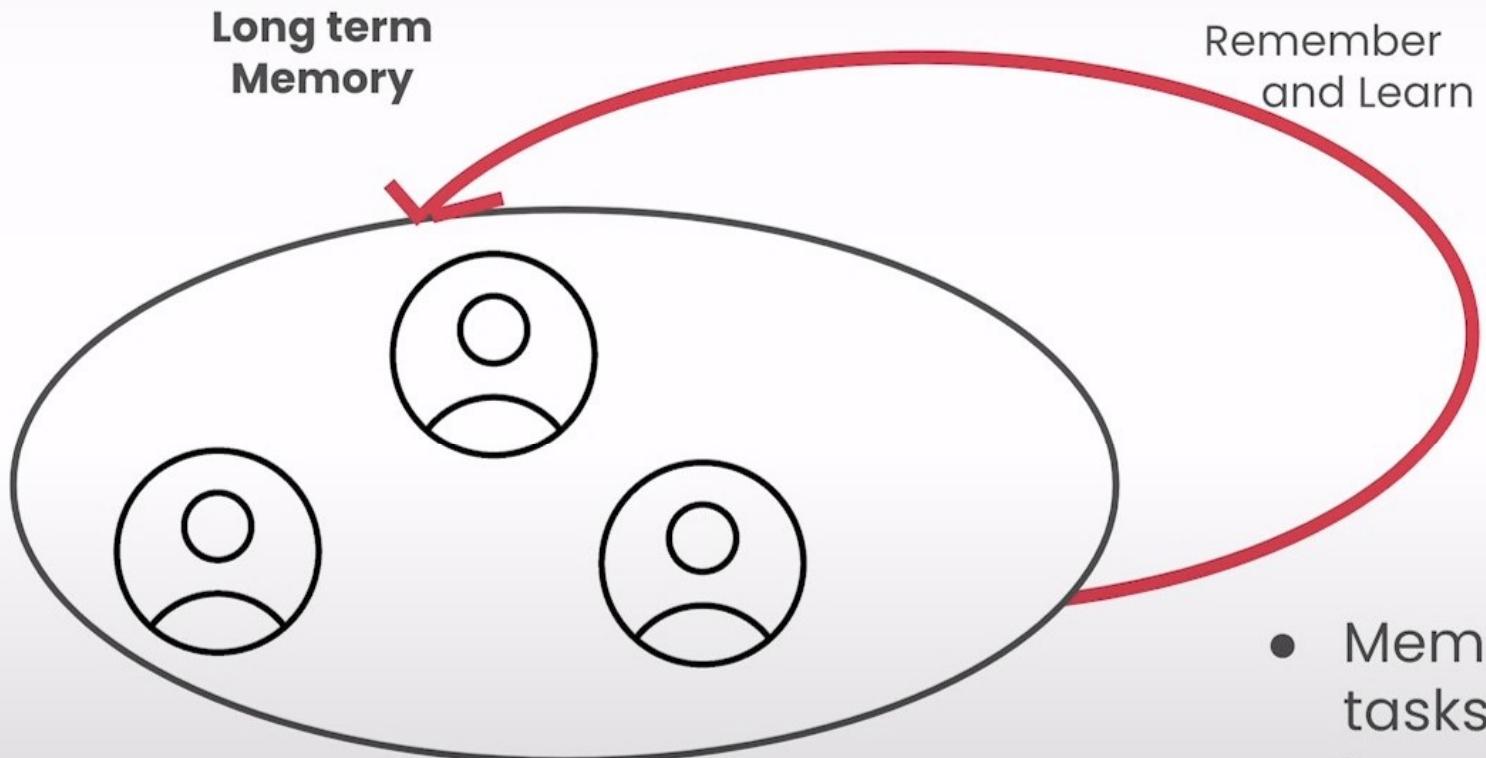


1. Long-term memory
2. Short-term memory
3. Entity memory



Short term Memory

- Memory during execution of a task.
- Share knowledge, activities, and learnings with other agents.
- Share intermediate information even before providing "task completion" output.



- Memory stored after execution of current tasks.
- Long term memory can be used in any future tasks.
- Leads to "self-improving" agents.

Entity Memory

Pretend news article (by ChatGPT)

Renewable energy corporations such as Tesla, led by CEO Elon Musk, and Orsted, based in Denmark, are at the forefront of the transition to sustainable energy. Meanwhile, tech giants like Google, under the leadership of Sundar Pichai, and Microsoft, with CEO Satya Nadella at the helm, are investing heavily in renewable energy projects and carbon offset programs to achieve carbon neutrality. Notably, countries like Germany, with its ambitious Energiewende policy, and China, the world's largest emitter of greenhouse gases, are implementing aggressive strategies to reduce emissions and accelerate the adoption of renewable energy. Additionally, startups like Beyond Meat, founded by Ethan Brown, and Impossible Foods, led by CEO Pat Brown, are disrupting the food industry with plant-based alternatives, significantly reducing the environmental impact of food production.

Entities

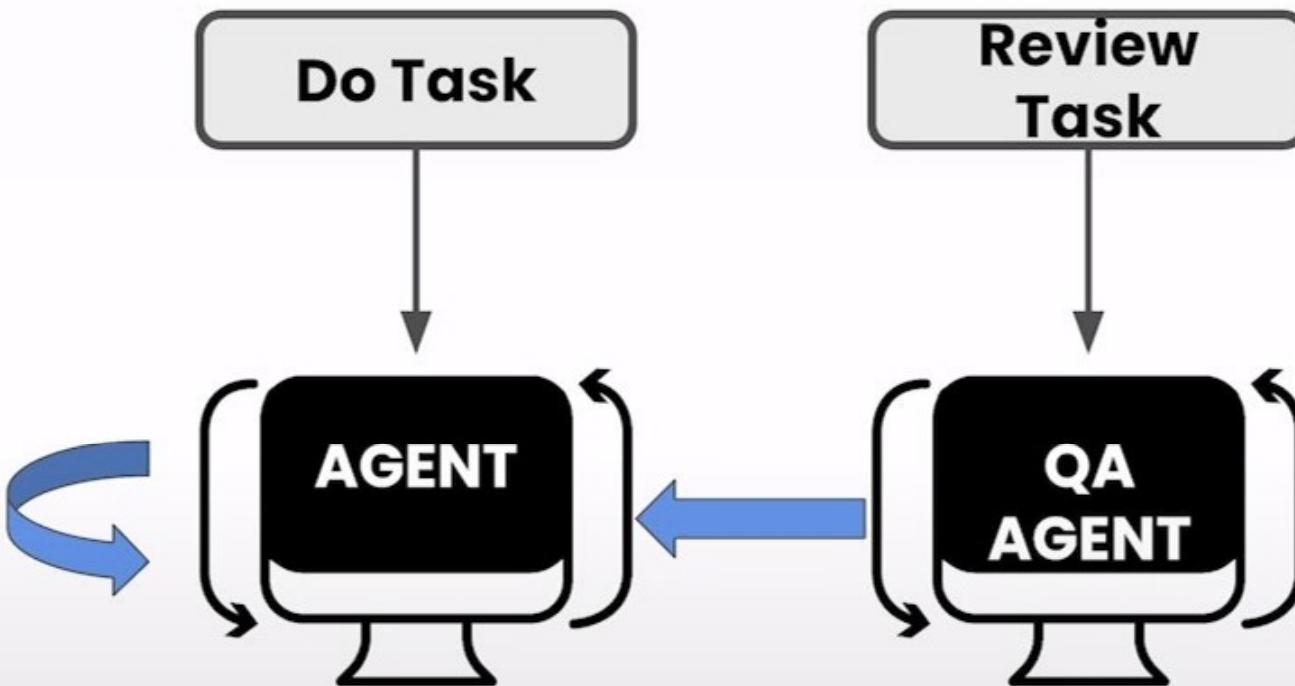
- persons,
- organizations,
- locations

Multi AI Agent Systems with crewAI

Multi agent customer
support automation
(code)

Press Esc to exit full screen

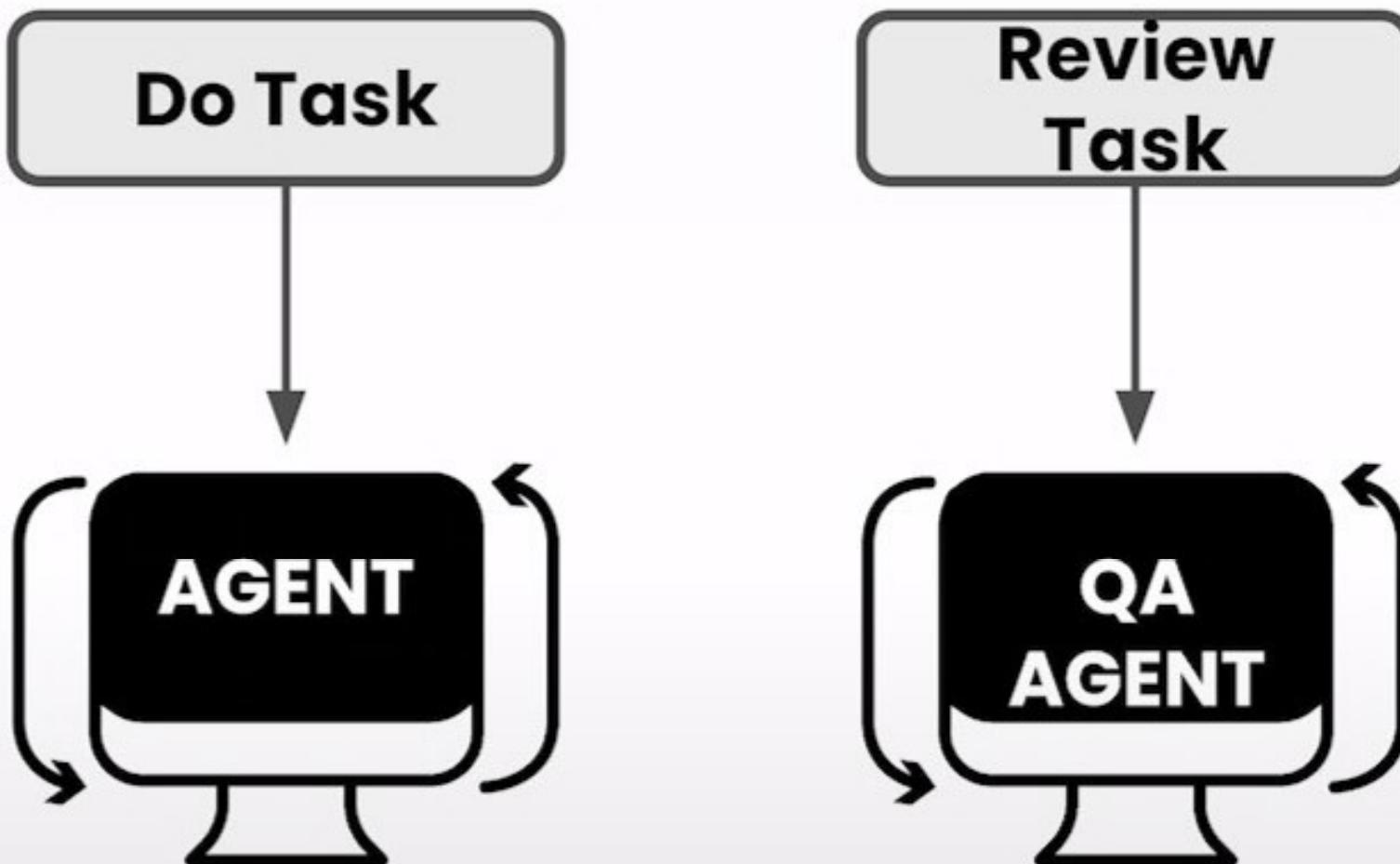
Allow Delegation



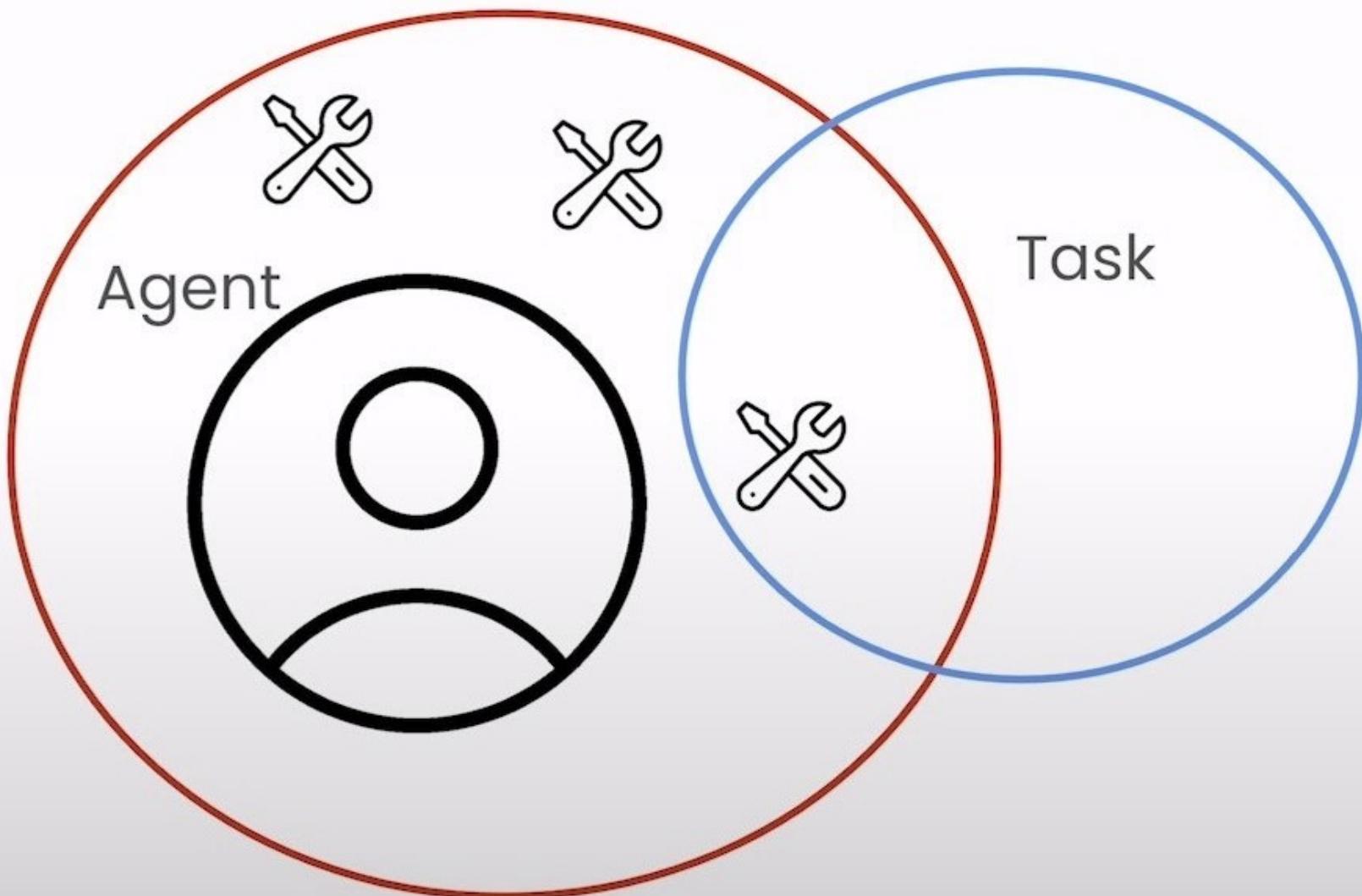
Not allowed to
delegate to
other agents
(does its own
work)

Can do its own
work and
delegate back
to other agent

Design Pattern: Quality Assurance



Assigning Tools



- We can give tools at Agent Level or Task Level.
- If you can use a tool at Agent Level, it can use it for any task that it performs.
- Task Level if you give a tool, it will only use it for the specific Task.
- Task tools override Agent tools.

Multi AI Agent Systems with crewAI

Mental framework for
agent creation



DeepLearning.AI



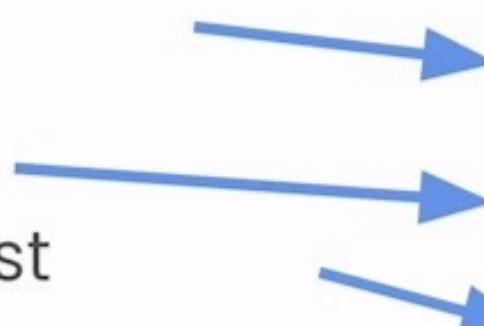
Manager

What is the Goal

What is the Process

What kind of people would I need to hire to get this done?



- **Okay**
 - Researcher
 - Writer
 - Financial Analyst
 - **Better**
 - HR Research Specialist
 - Senior copywriter
 - FINRA Approved Analyst
- 



- Agents "self improve" using memory
- Guardrails prevents agents from going into "rabbit holes" (unproductive, repetitive loops)
- Agents always attempt to get to an answer (avoid iterating indefinitely)
- Focus
 - narrowly defined task
 - specific agent roles and objectives
 - limited set of tools assigned to one agent

Multi AI Agent Systems with crewAI

Key elements of agent tools



DeepLearning.AI

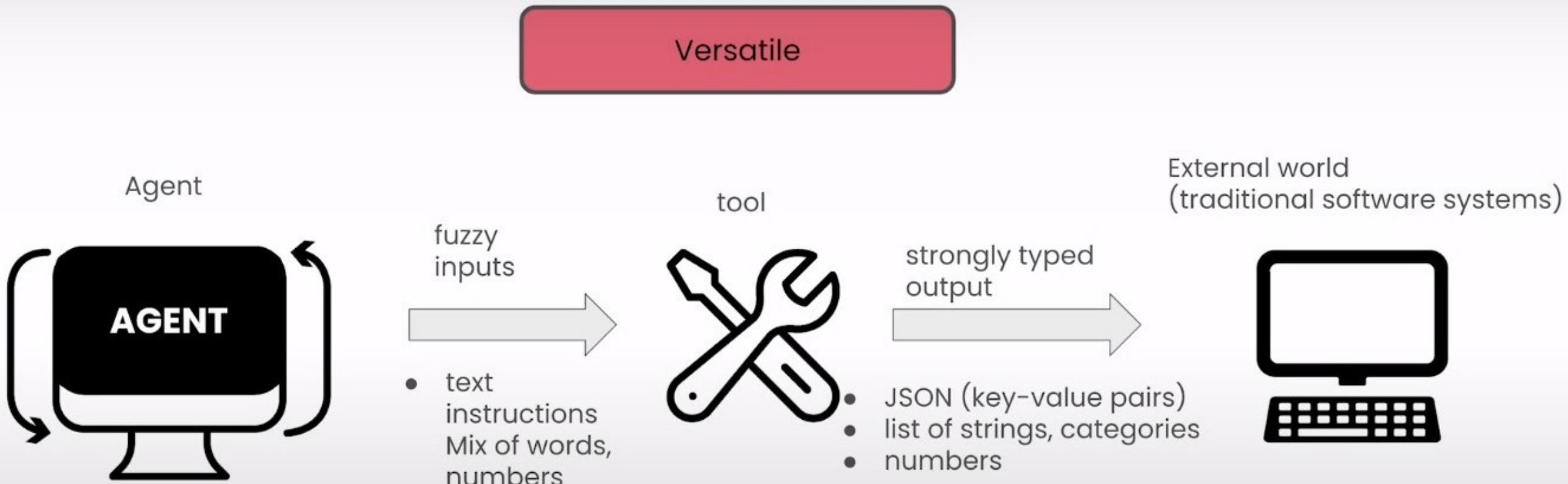
What makes a great Tool?



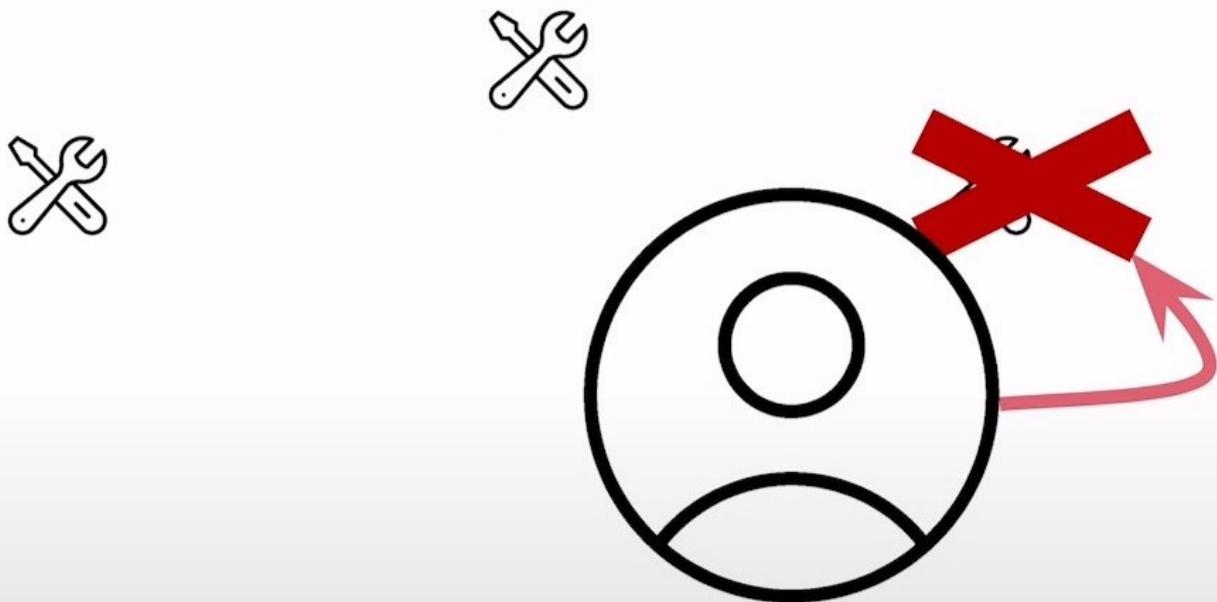
Versatile

Fault-tolerant

Caching



Fault-tolerance

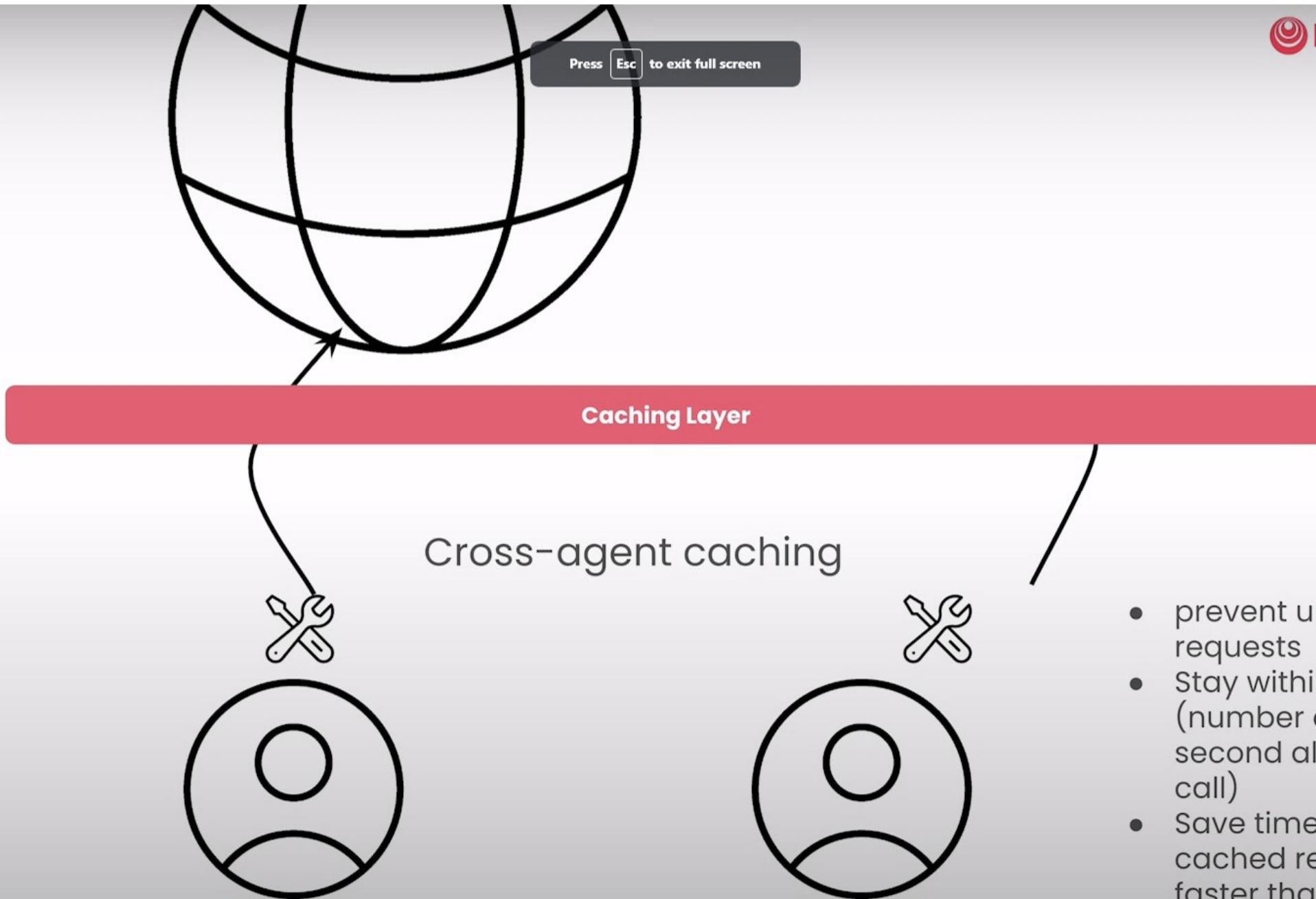


What happens when an exception/error occurs?

Option 1: stop execution

Option 2: Fail gracefully (and try again)

- send error message back to agent
- Ask agent to retry given the error message



Examples of tools

- Search the internet
- Scrape a website
- Connect to a database
- Call an API
- Send notifications

and many more

Google Serper Search	CSV RAG Search	Code Docs RAG Search
Scrape Website	XML RAG Search	Youtube Video RAG Youtube
Directory Read	JSON RAG Search	Channel RAG Search
File Read	Docx Rag Search	
Selenium Scraper	MDX RAG Search	
Directory RAG Search	PG RAG Search	
PDF RAG Search	Website RAG Search	
TXT RAG Search	Github RAG Search	



What is the Goal

What is the Process

What kind of individuals would I need to hire to get this done?

- In here hiring individual are Agents

Which processes and tasks do I expect the individuals on my team to do?

Task

Task

Task

Task

Task

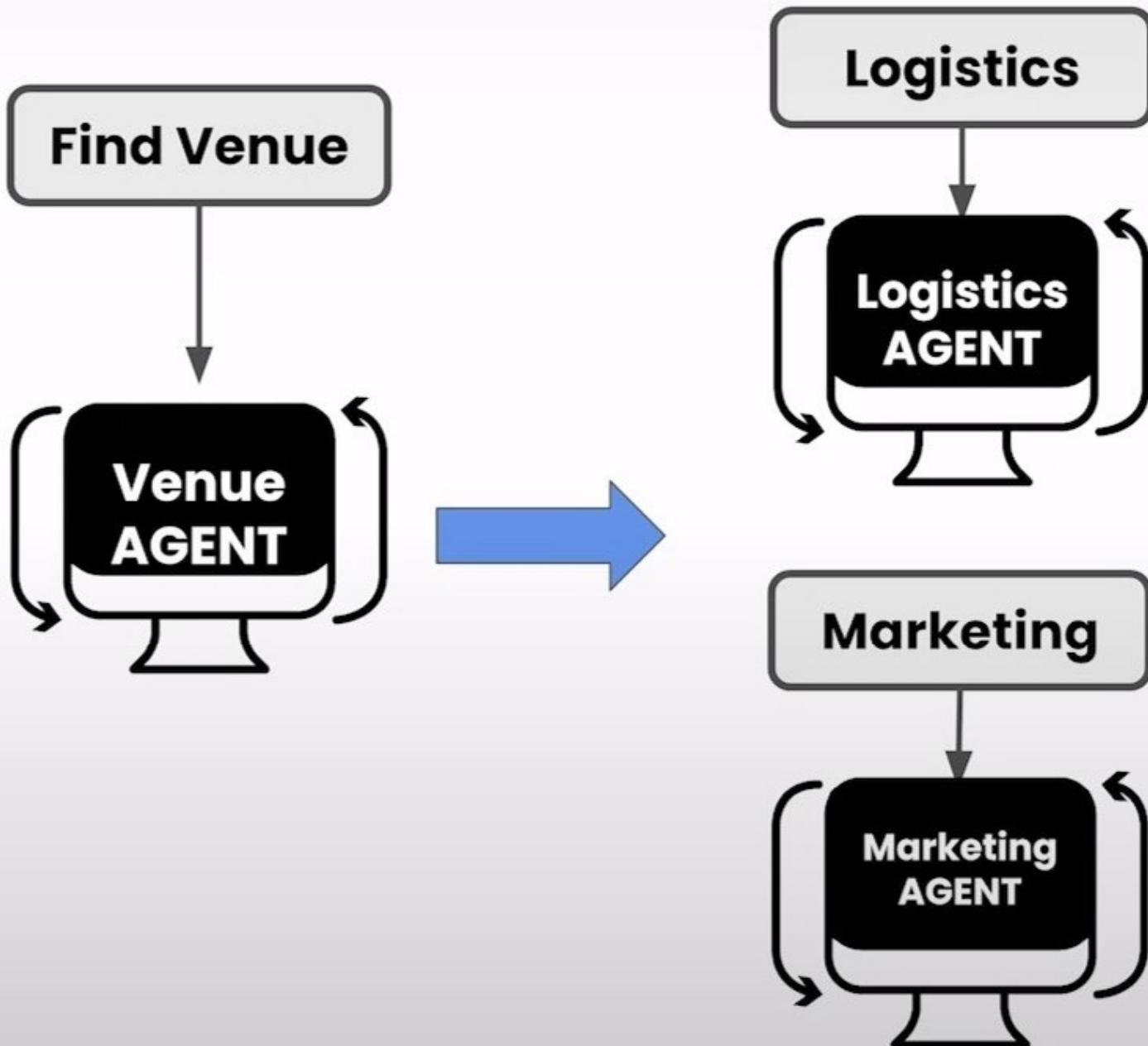


Which processes and tasks do I expect the individuals on my team to do?

Task

- Clear description of the task
- Set a clear and concise expectation
 - This would help in achieving better, clear and better the context the better are the results.
- Set context
- Set a callback
- Override Agent tools with specific task tools
- Force human input before end of task
- Execute asynchronously
- Output as Pydantic
- Output as JSON
- Output as file
- Run in parallel

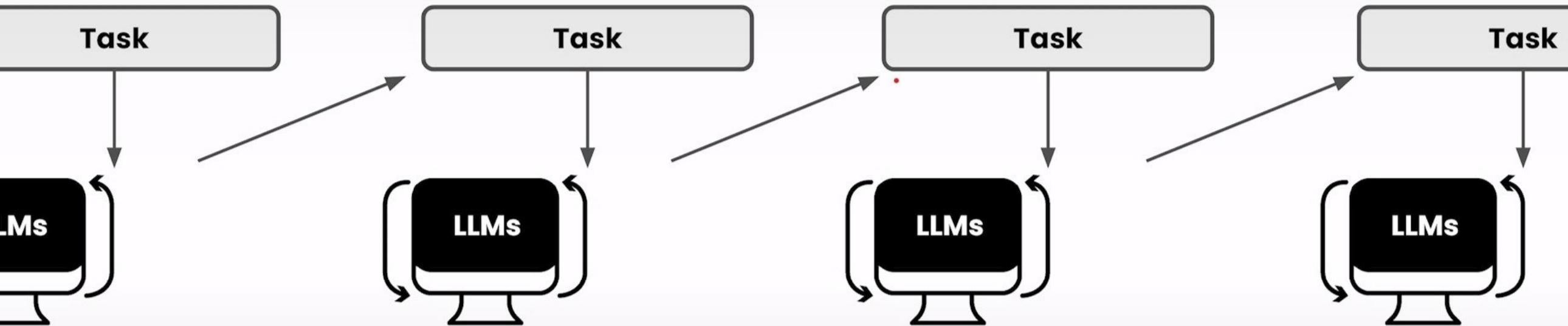
Asynchronous Execution



Multi AI Agent Systems with crewAI

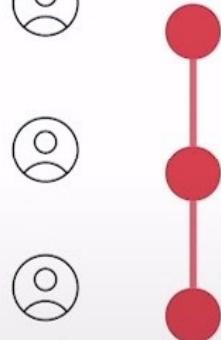
Multi agent collaboration





- We can do the same with Agents as well.
- If there are too many tasks there might be loss of Information by the time it reaches the last task same as RNN and LSTM.

Processes



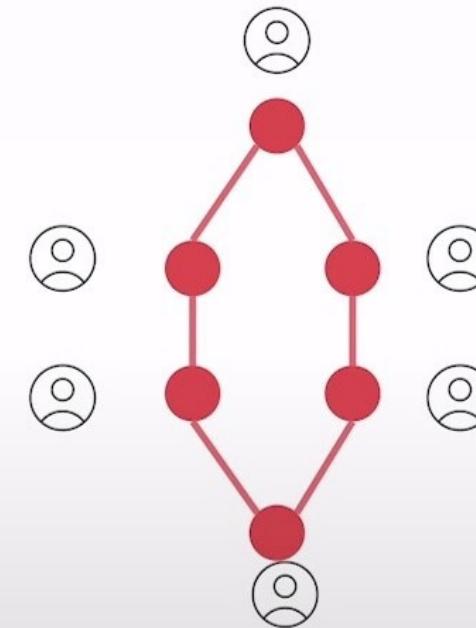
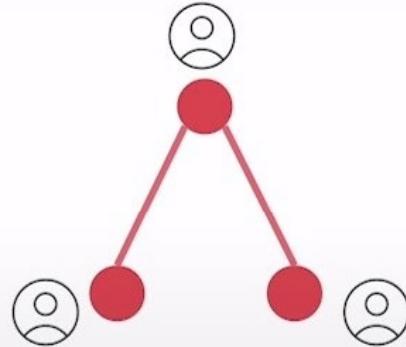
- Hierarchical
- Parallel
- Asynchronous Execution

Crew allows agents to fully cooperate.

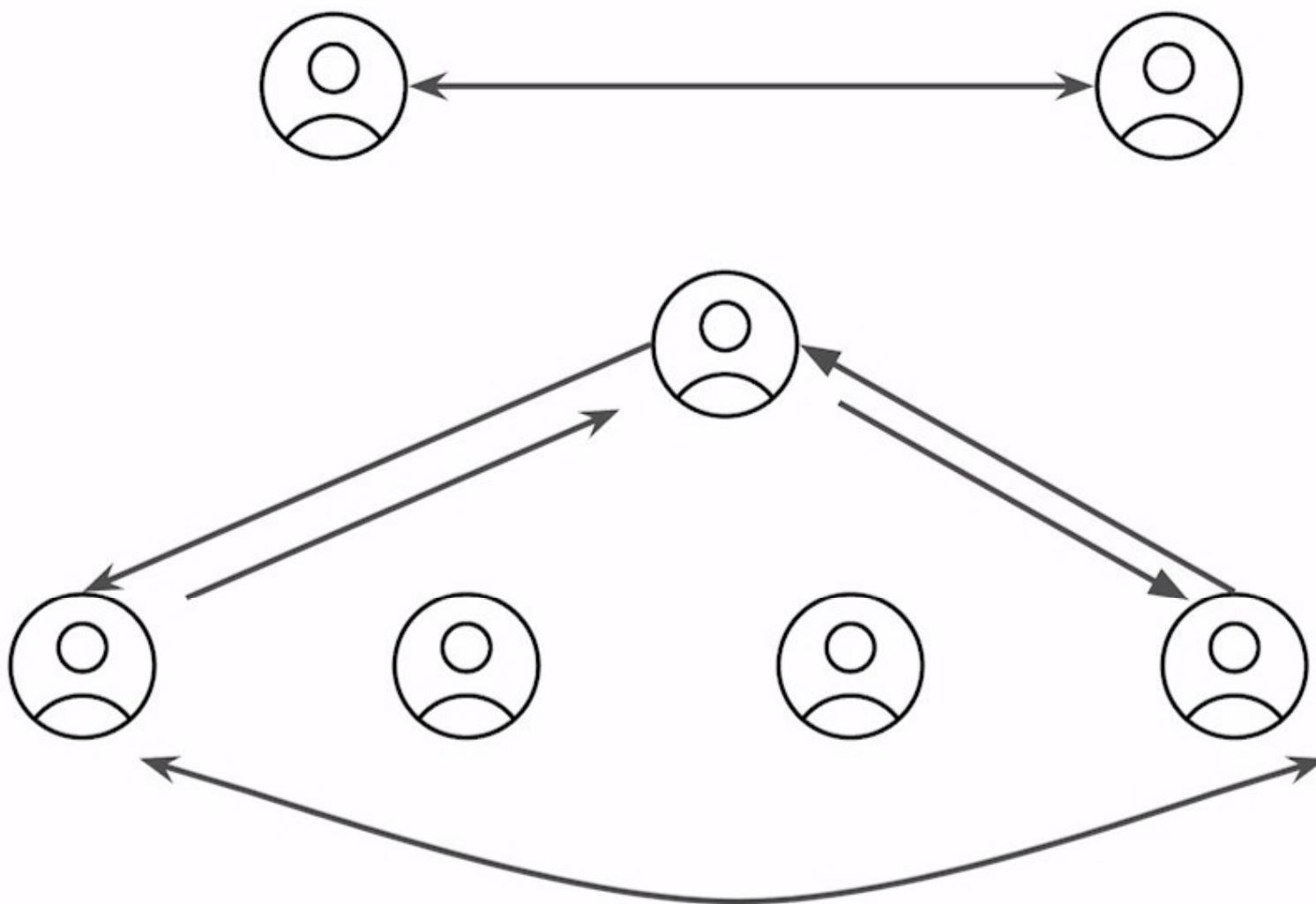
Go off any predefined paths, if necessary to fulfil the tasks.

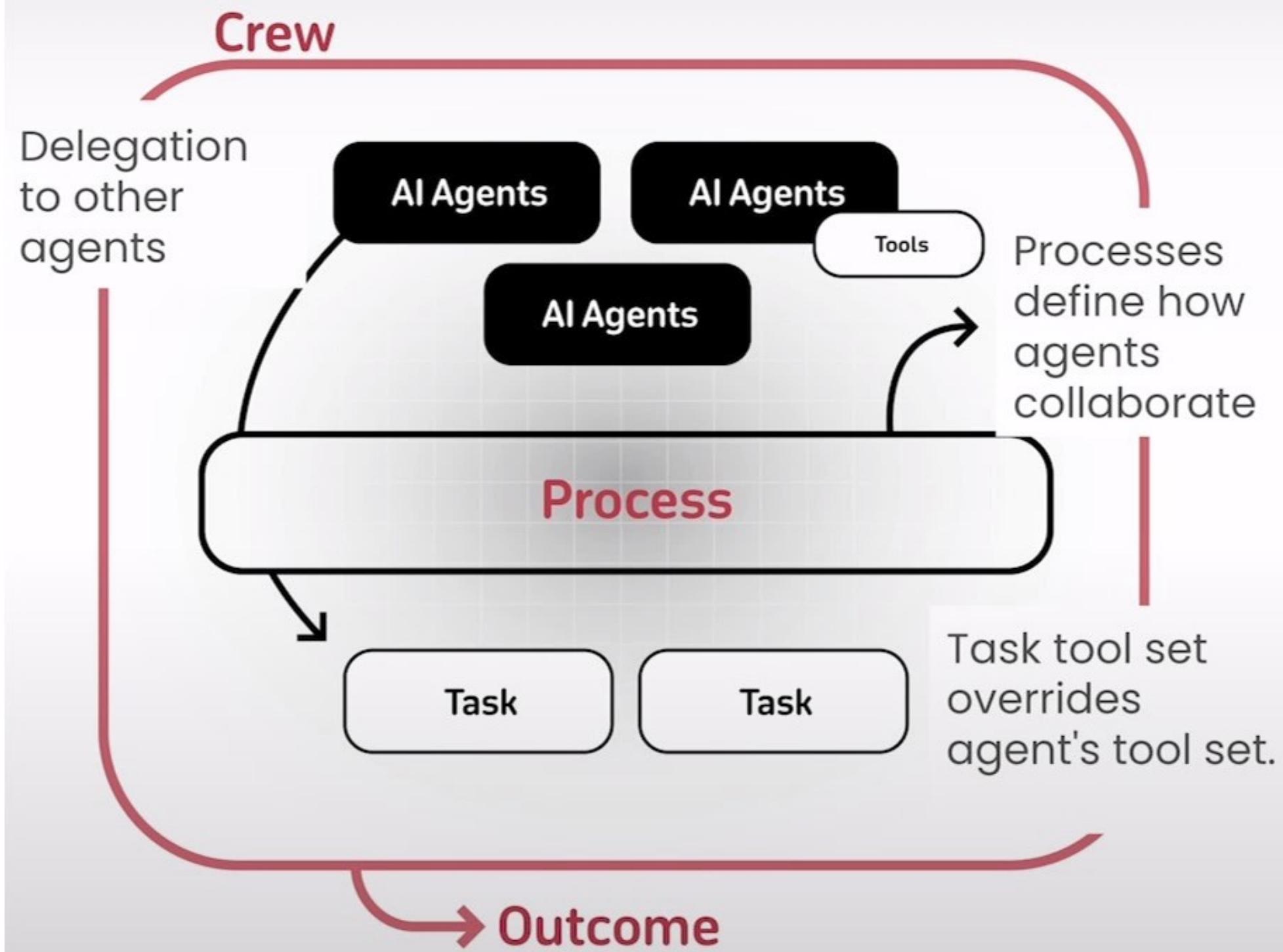
They can delegate to each other ask question to each other.

Manager to reduce the work.



Collaboration





Job Application Crew

your first multi-agent system

What is the Goal?

Maximize your chances of getting an interview for a given job posting

What is the Process?

- Learn about the job requirements
- Cross that with your skill set and experiences
- Reshape resume to highlight relevant areas
- Rewrite resume with appropriate language
- Set talking points for your initial interview