



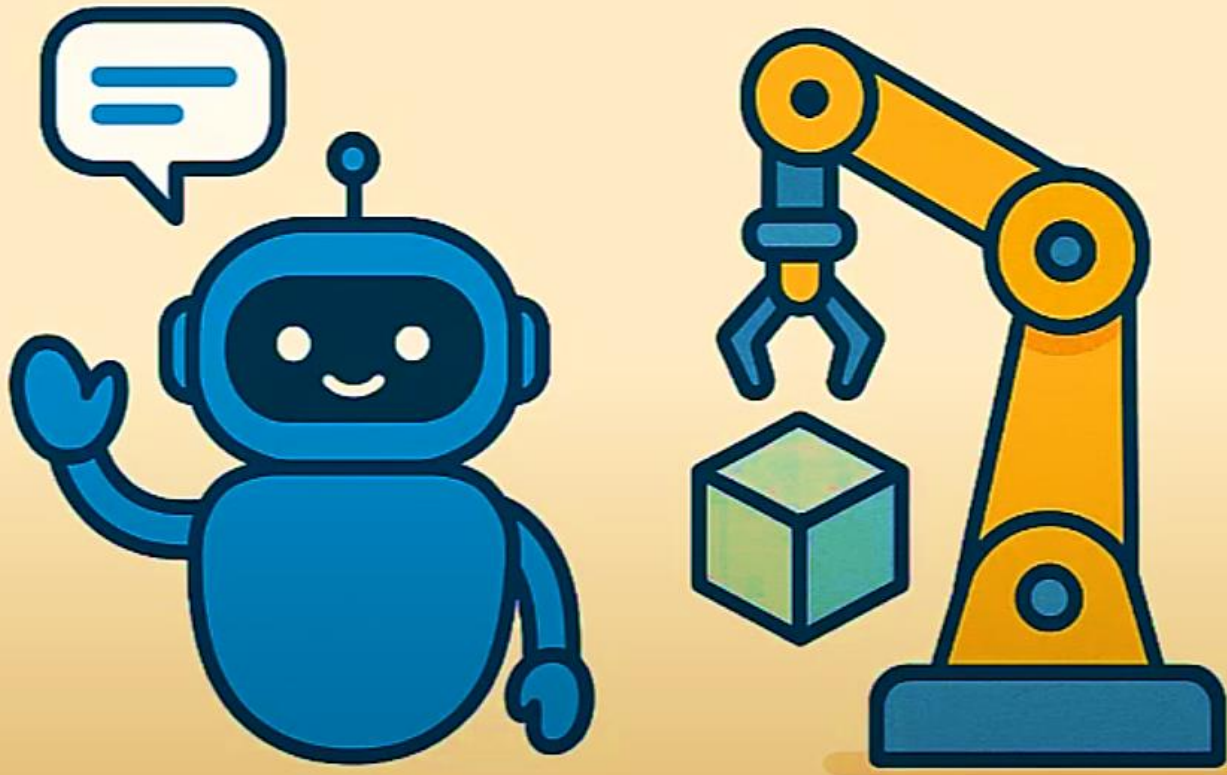
Agentic AI: The Next Wave of Intelligence

Unlocking the Power of Intelligent Agents

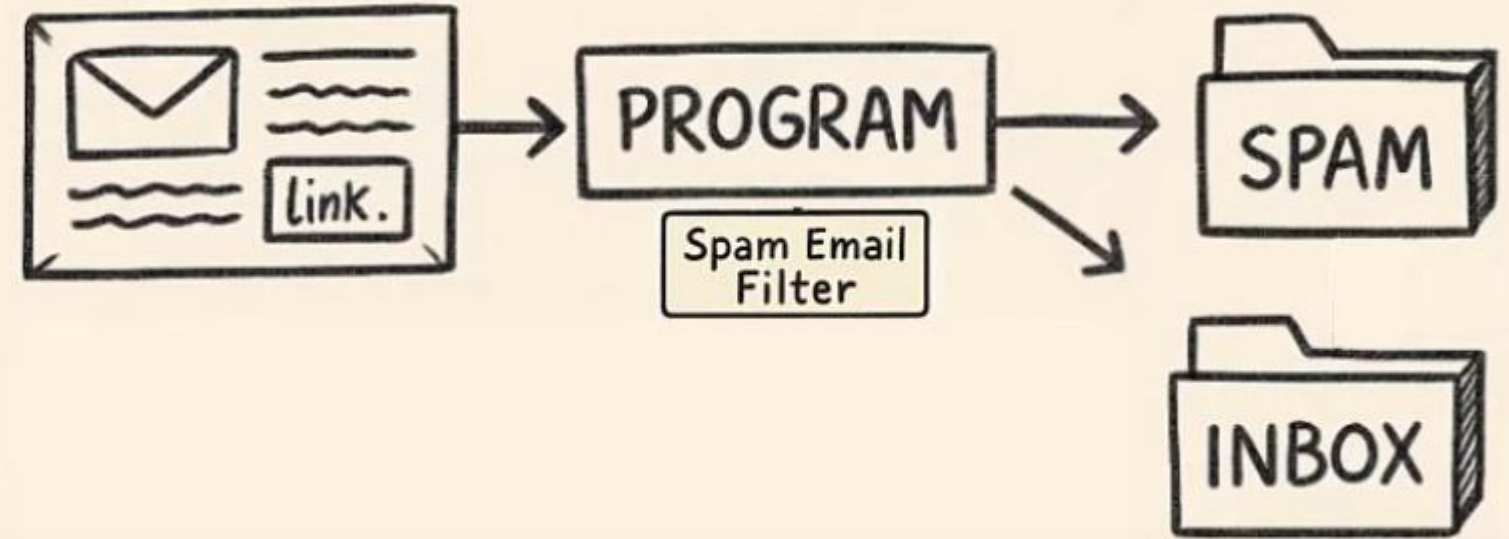
by Dr. Nudrat Nida

Traditional Artificial Intelligence






Helping us every day —
from chatbots to robots.



Suppose you have a spam email filter



Traditional Artificial Intelligence

Feature	Description
 Rule-based systems	Predefined IF-THEN rules to infer conclusions from data.
 Logic & reasoning	Uses propositional and predicate logic for inference.
 Knowledge representation	Facts, relationships, and rules encoded in ontologies, semantic nets.
 Goal-driven search	Uses search algorithms (DFS, BFS, A*) for planning and decision-making.
 Symbol manipulation	Represents problems symbolically, not statistically.

Traditional Artificial Intelligence

System Type	Example
Expert systems	MYCIN (medical diagnosis)
Planning agents	STRIPS (robot planning tasks)
Logic solvers	Prolog-based theorem provers
Game-playing AI	Deep Blue (chess using brute-force)
Chatbots	ELIZA (1966) using pattern matching

AI AGENTS

- **Definition:**

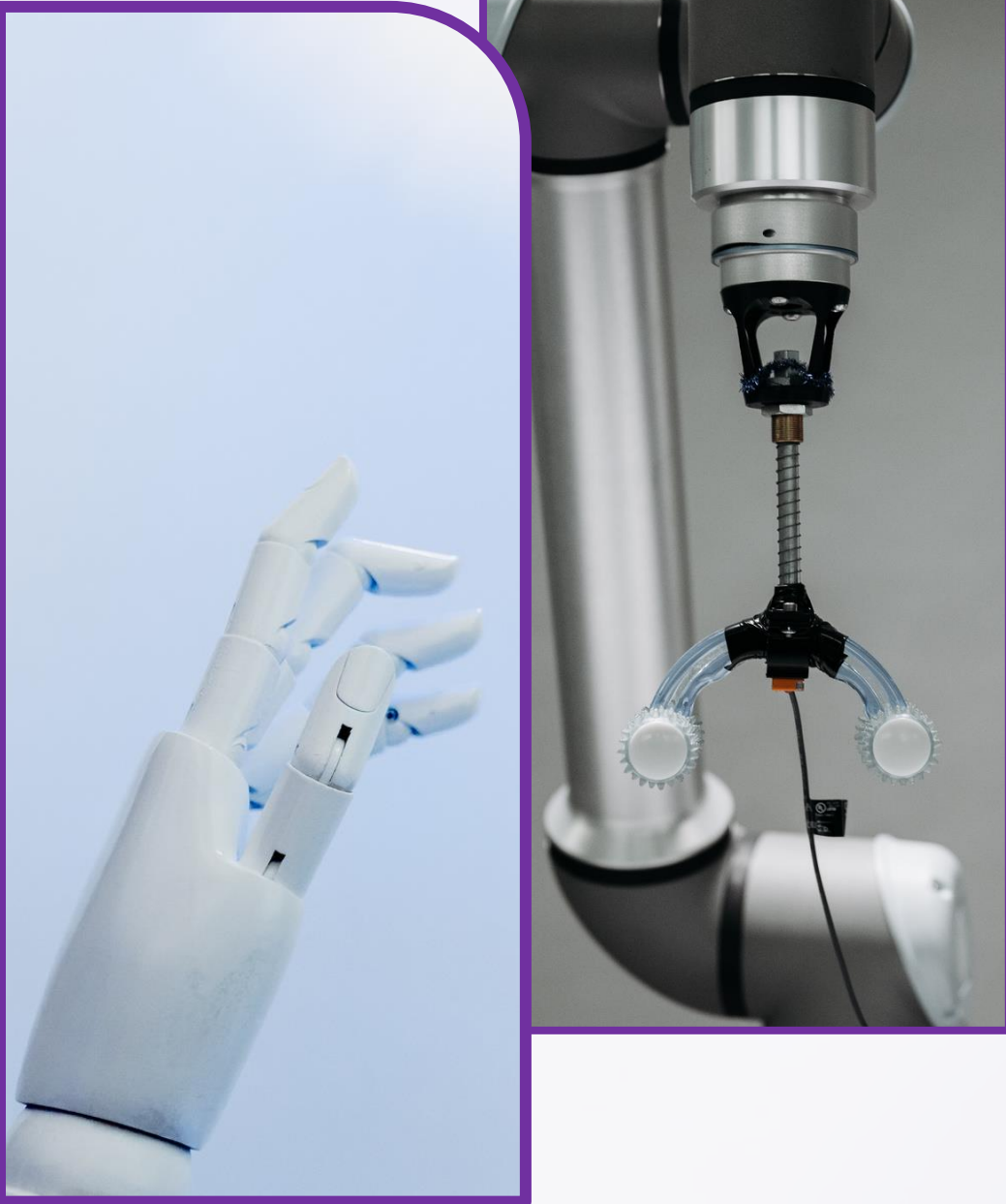
An AI agent is any AI system that perceives its environment and acts upon it to achieve some goal.

- **Examples:**

- A chess engine that selects moves.
- A recommendation system that suggests products.
- A navigation app that gives directions.

- **Key Point:**

AI agents can be simple or complex, but many are reactive and operate only in narrow, predefined ways.



What is Agentic AI?



Beyond Reactive

Agentic AI goes beyond reactive AI, which simply responds to stimuli. It actively pursues goals and objectives, adapting its actions based on feedback and learning from experience.

Proactive and Adaptive

Instead of passively waiting for instructions, agentic AI systems are proactive and adaptive. They can anticipate needs, generate solutions, and autonomously make decisions within defined parameters.



Key Characteristics of Agentic AI

1

Goal-Oriented

Agentic AI systems are designed with specific goals in mind, driving their actions and decisions.

2

Autonomous

They can operate independently, making decisions and taking actions without constant human intervention.

3

Self-Learning

Agentic AI continuously learns and improves its performance based on data and feedback.

4

Contextual Awareness

They can understand and adapt to changing contexts, making decisions based on real-time information.

AI Agents Versus Agentic AI

Feature	AI Agents	Agentic AI
Scope	Typically narrow or task-specific	Broad, goal-seeking across domains
Autonomy	Medium	High
Complexity	Often reactive or limited planning	Strategic and long-horizon planning
Real-world status	Common and deployed widely	Still mostly theoretical or emerging
Concerns	Functionality, reliability	Safety, alignment, controllability



Generative AI Versus Agentic AI

Feature	Generative AI	Agentic AI
Primary Function	Generate content	Act autonomously to achieve goals
Input / Output	Prompt-based (e.g., Q&A, image gen)	Continuous interaction with environment
Initiative	Reactive	Proactive
Examples	ChatGPT, Midjourney, Claude	AutoGPT, Devin, theoretical AGI
Risks	Misuse of generated content	Unintended behaviors, lack of alignment



Benefits of Agentic AI

Increased Efficiency

Agentic AI can automate tasks, optimize processes, and free up human resources for more strategic work.

Enhanced Productivity

By making intelligent decisions and taking proactive actions, agentic AI can boost productivity across industries.

Improved Decision-Making

Leveraging data analysis and predictive modeling, agentic AI can support better informed decision-making.

Personalized Experiences

Agentic AI can tailor experiences to individual needs and preferences, leading to greater customer satisfaction.



Manufacturing Company



HR Department



Manufacturing &
Production Dept.



Logistics & Supply
Chain Dept.



Sales & Marketing
Department



Finance &
Accounting Dept.



Customer
Support Dept.



R&D
Department



Information
Technology (IT) Dept.

Crew



HR Agent



Manufacturing Dept Agent



Logistics & Supply Chain Dept. Agent



Sales & Marketing Department Agent



Finance Dept. Agent



Customer Support Dept. Agent

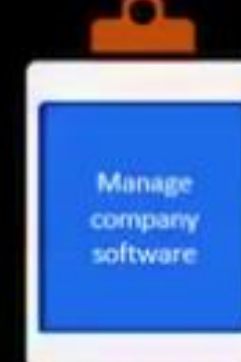
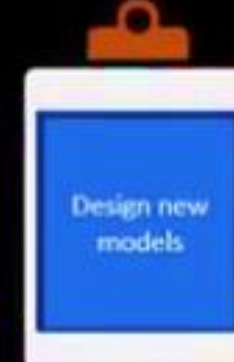
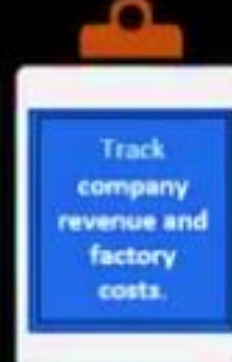
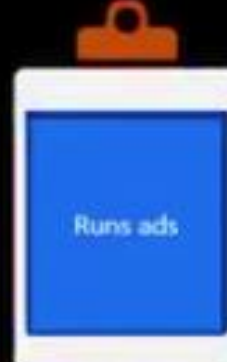


R&D Dept. Agent



Information Technology (IT) Dept.

Process



Crew



Process



Example 1:

AI-Powered Trip Advisor 🌐:



Flight Booking Agent



Hotel Recommendation Agent



Sightseeing Planner Agent



Food Advisor Agent



Trip Planner Agent



Best flights & hotels



Top tourist attractions



Local food recommendations



Daily schedule

Example 2:

AI Chatbots 🤖



Tech Support Agent



Sales Agent



FAQ Agent

Example 4:

News Summarization



News Fetching Agent



Summarization Agent

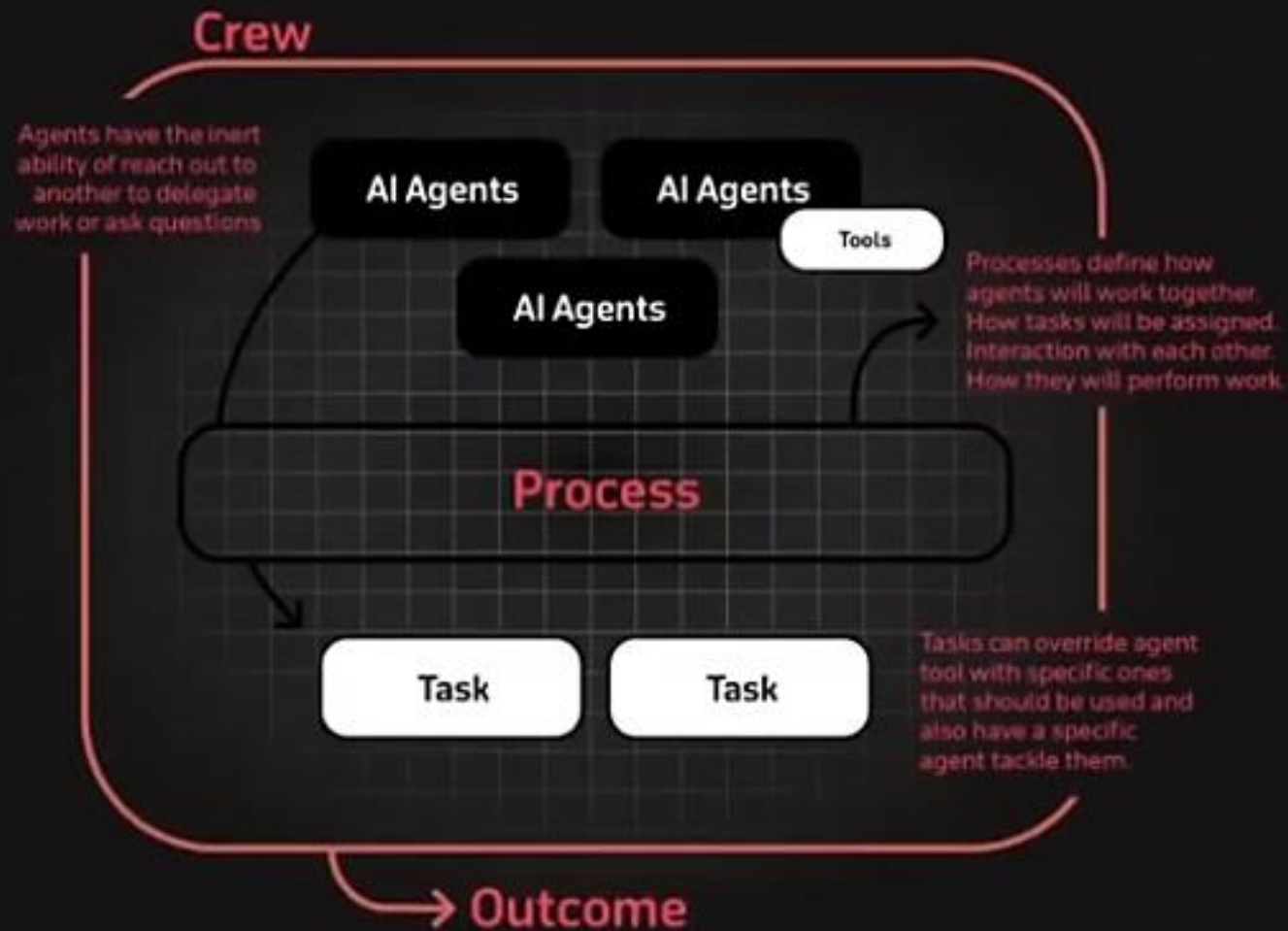


Writer Agent

How CrewAI works?



- ① Just like a company has departments (Sales, Engineering, Marketing) working together under leadership to achieve business goals, CrewAI helps you create an organization of AI agents with specialized roles collaborating to accomplish complex tasks.



CrewAI Framework Overview

Agents ●

Tools

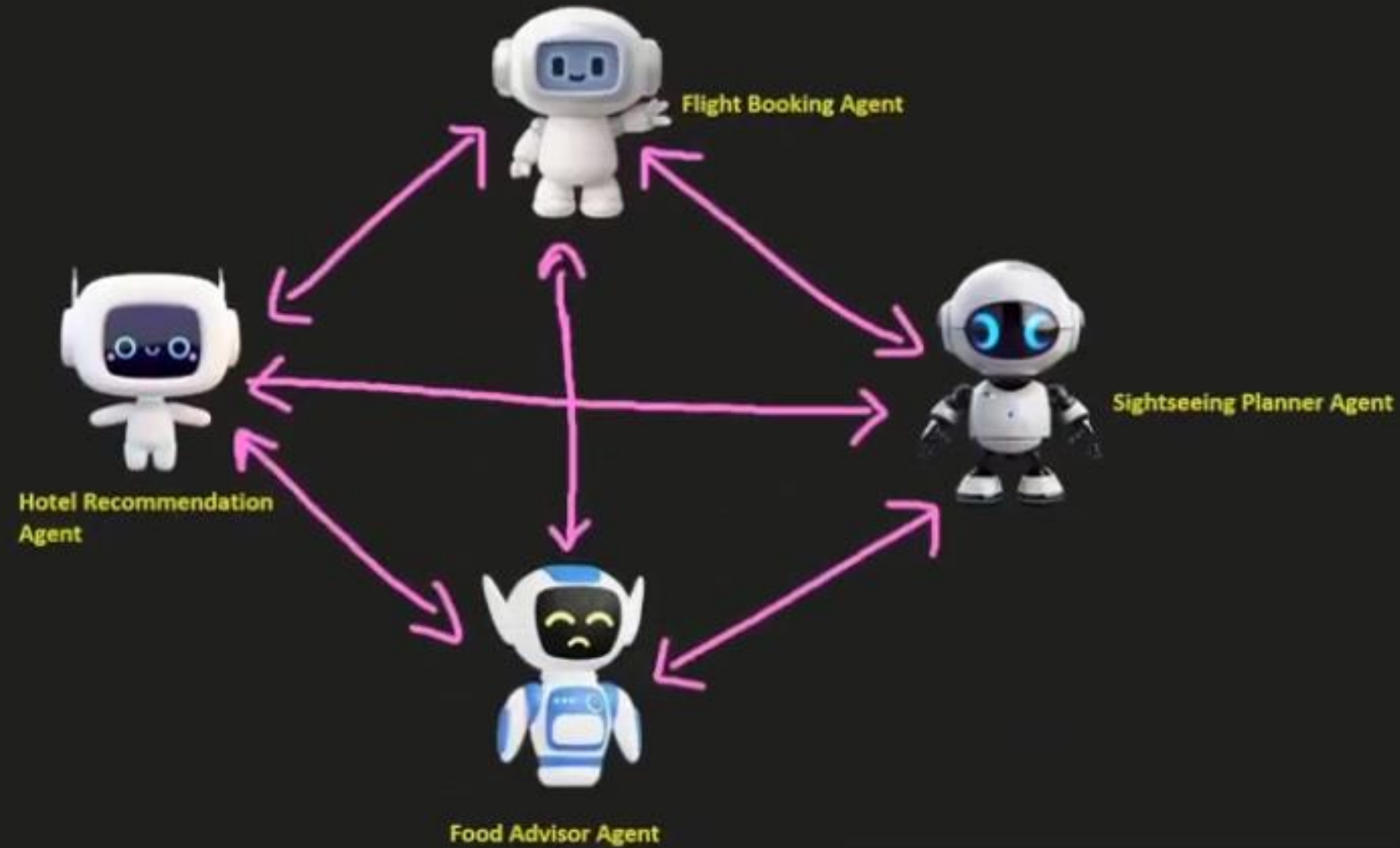
Tasks

Process

Crew



Agents:



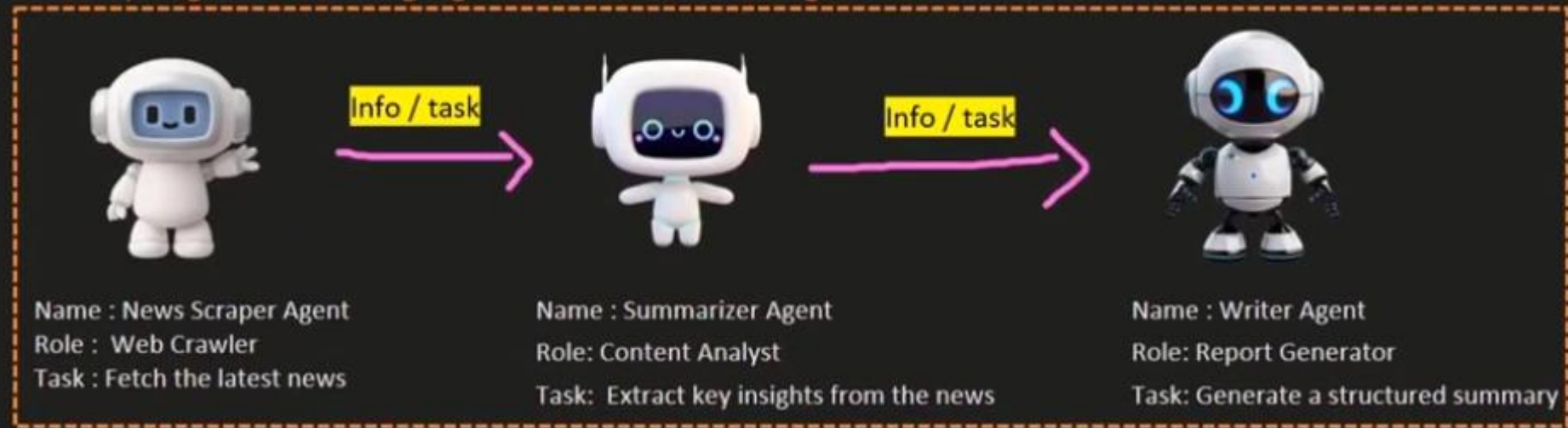
Each CrewAI Agent has:



- ✓ A Name -
- ✓ A Role –
- ✓ A Goal –
- ✓ A Backstory –
- ✓ A Model (LLM) –
- ✓ Tools (APIs, Databases, etc.) –

How Agents Work Together?

Multiple agents are working together to achieve common goal



```
# Creating a News Scraper Agent with the tool
news_scraper = Agent(
    name="News Scraper",
    role="Web Crawler",
    goal="Fetch the latest AI-related news from the internet",
    backstory="An expert in web crawling and retrieving news articles.",
    llm=ChatOpenAI(model_name="gpt-4"),
    tools=[news_scraper_tool] # Assigning the tool
)
```

```
# Creating a Summarizer Agent
summarizer = Agent(
    name="Summarizer",
    role="Content Analyst",
    goal="Extract the key insights from the retrieved news articles",
    backstory="An AI specialized in summarizing long articles into concise",
    llm=ChatOpenAI(model_name="gpt-4")
)
```

```
# Creating a Writer Agent
writer = Agent(
    name="Writer",
    role="News Reporter",
    goal="Write a structured news summary based on the extracted insights",
    backstory="A journalist AI that turns raw data into well-structured news reports.",
)
```

Built in tool:

```
!pip install -U duckduckgo-search
```

```
from langchain_community.tools import DuckDuckGoSearchRun

def search_duckduckgo(query: str):
    """Searches DuckDuckGo using LangChain's DuckDuckGoSearchRun tool."""
    search = DuckDuckGoSearchRun()
    return search.invoke(query) ●
```

Custom tool:

```
def add(a: float, b: float) -> float:  
    """Add two numbers."""  
    return a + b
```

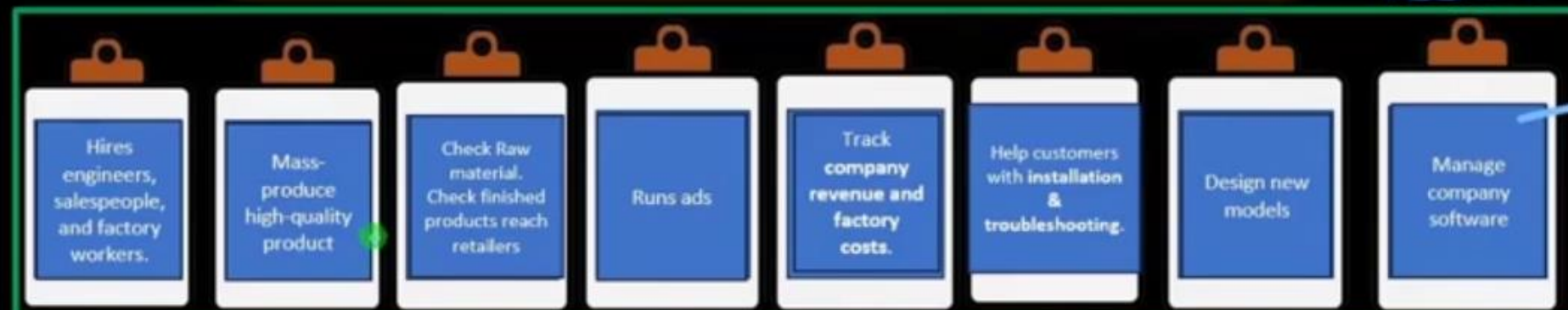
```
def multiply(a: float, b: float) -> float:  
    """Multiply two numbers."""  
    return a * b
```

Tasks are the specific actions that AI agents must complete.

Crew



Process



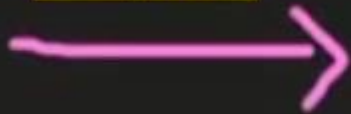
Task

Multiple agents are working together to achieve common goal



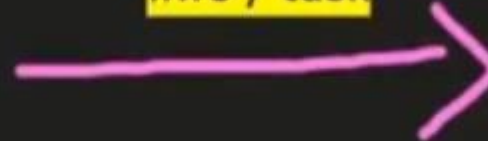
Name : News Scraper Agent
Role : Web Crawler
Task : Fetch the latest news

Info / task



Name : Summarizer Agent
Role: Content Analyst
Task: Extract key insights from the news

Info / task



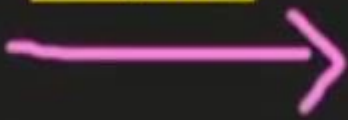
Name : Writer Agent
Role: Report Generator
Task: Generate a structured summary

Multiple agents are working together to achieve common goal



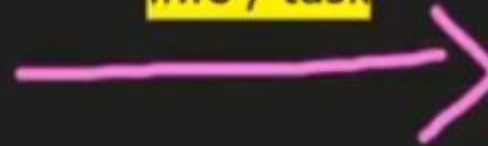
Name : News Scraper Agent
Role : Web Crawler
Task : Fetch the latest news

Info / task



Name : Summarizer Agent
Role: Content Analyst
Task: Extract key insights from the news

Info / task



Name : Writer Agent
Role: Report Generator
Task: Generate a structured summary

Task: Fetch news

Assigned Agent: News Scraper Agent

Goal: Retrieve the latest AI news



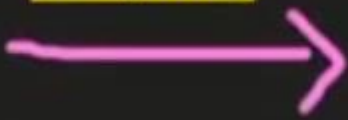
News Scraper Agent

Multiple agents are working together to achieve common goal



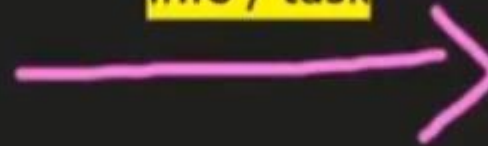
Name : News Scraper Agent
Role : Web Crawler
Task : Fetch the latest news

Info / task



Name : Summarizer Agent
Role: Content Analyst
Task: Extract key insights from the news

Info / task



Name : Writer Agent
Role: Report Generator
Task: Generate a structured summary

Task : Summarize key points

Assigned Agent : Summarizer Agent

Goal: Extract important information



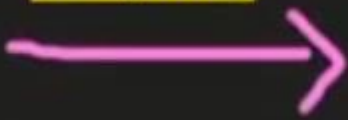
Summarizer Agent

Multiple agents are working together to achieve common goal



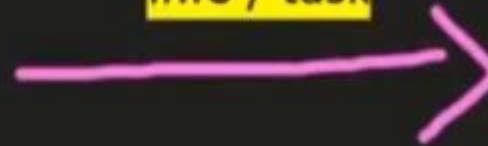
Name : News Scraper Agent
Role : Web Crawler
Task : Fetch the latest news

Info / task



Name : Summarizer Agent
Role: Content Analyst
Task: Extract key insights from the news

Info / task



Name : Writer Agent
Role: Report Generator
Task: Generate a structured summary

Task: Write the final report

Assigned Agent: Writer Agent

Goal: Create a well-structured article



Writer Agent



News Scraper Agent



Summarizer Agent



Writer Agent

```
# Define AI Agents
news_scraper = Agent(
    name="News Scraper",
    role="Web Crawler",
    goal="Fetch AI-related news",
    llm=ChatOpenAI(model_name="gpt-4")
)

summarizer = Agent(
    name="Summarizer",
    role="Content Analyst",
    goal="Summarize the key points of the articles",
    llm=ChatOpenAI(model_name="gpt-4")
)

writer = Agent(
    name="Writer",
    role="News Reporter",
    goal="Generate a structured news summary",
    llm=ChatOpenAI(model_name="gpt-4")
)
```

```
# Define Tasks
fetch_news_task = Task(
    description="Fetch AI news from online sources.",
    agent=news_scraper
)

summarization_task = Task(
    description="Summarize the key points of the fetched news articles.",
    agent=summarizer
)

writing_task = Task(
    description="Write a detailed news report from the summarized information.",
    agent=writer
)
```

Process:

workflow management system



Task: Fetch news

Assigned Agent: News Scraper Agent

Process Type: Step 1 (Start)

Task : Summarize key points

Assigned Agent : Summarizer Agent

Process Type: Step 2 (After Fetching News)



Task: Write the final report

Assigned Agent: Writer Agent

Process Type: Step 3 (Final Output)



News Scraper Agent

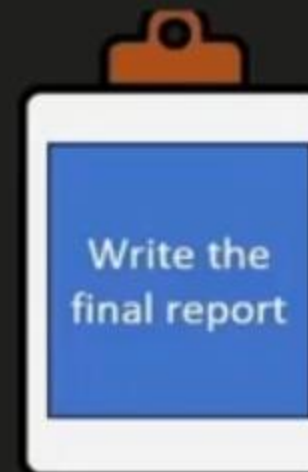
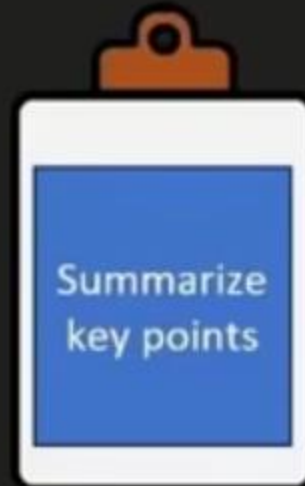


Summarizer Agent



Writer Agent

process





News Scraper Agent

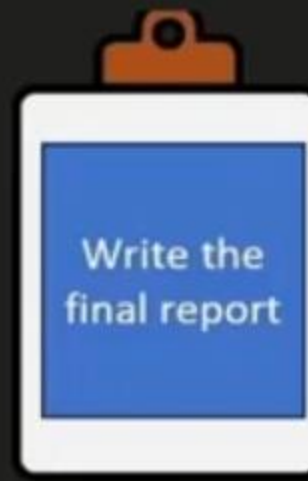
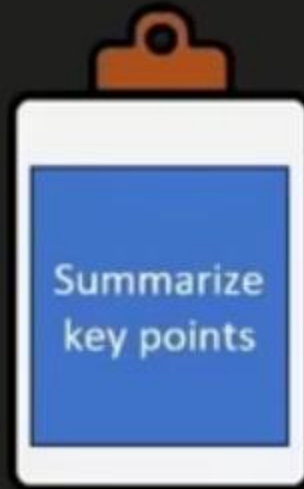


Summarizer Agent



Writer Agent

process



Types of Execution in a Process:

Sequential Execution (Step-by-Step)

Task 1 → Task 2 → Task 3

Fetch news → Summarize → Write report

Parallel Execution (Multiple Tasks at Once)

Task 1 & Task 2 → Task 3

Fetch news & summarize at the same time →
Write report

Agentic AI: The Next Wave of Intelligence

Hands on Exercise