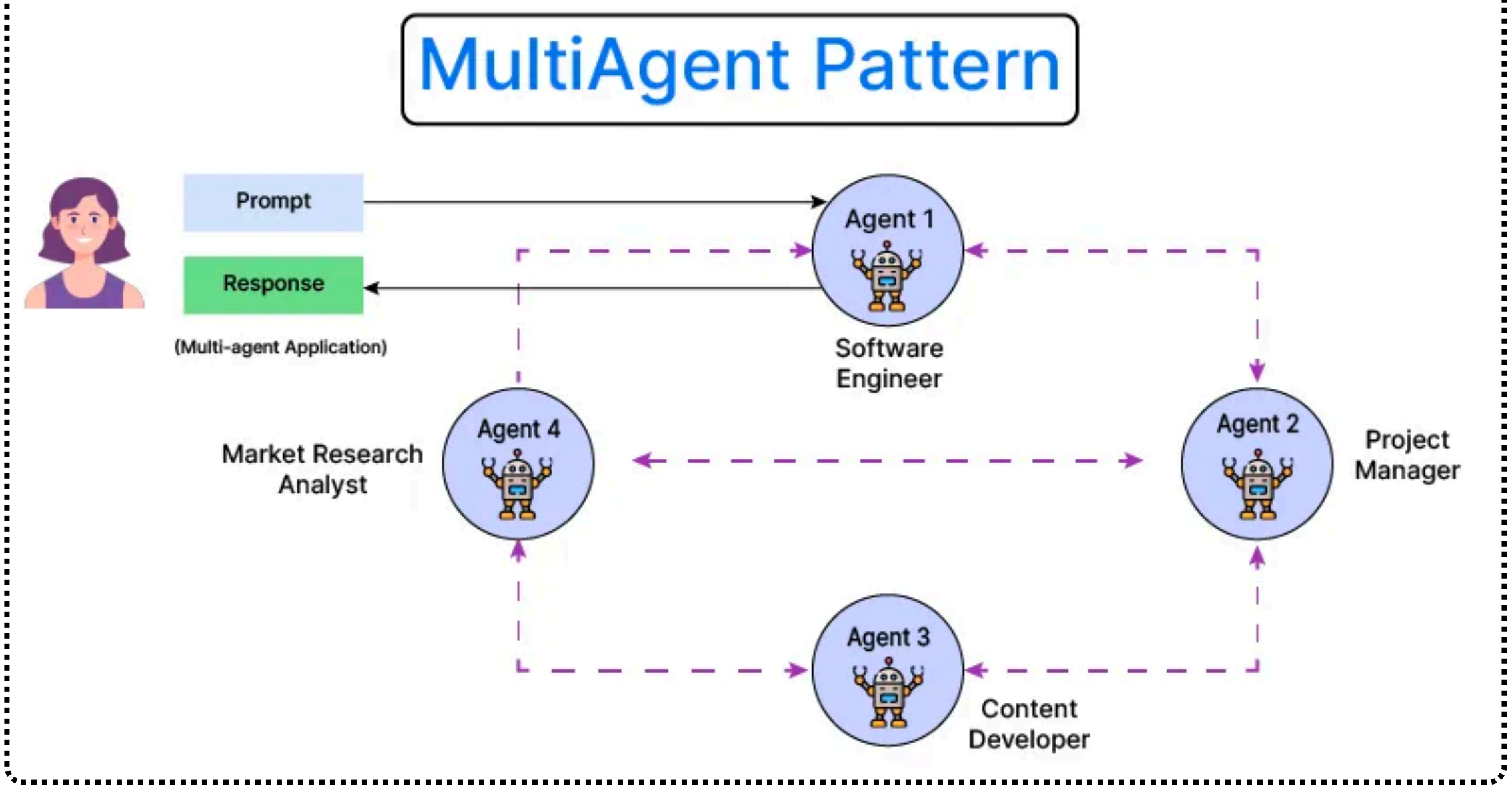
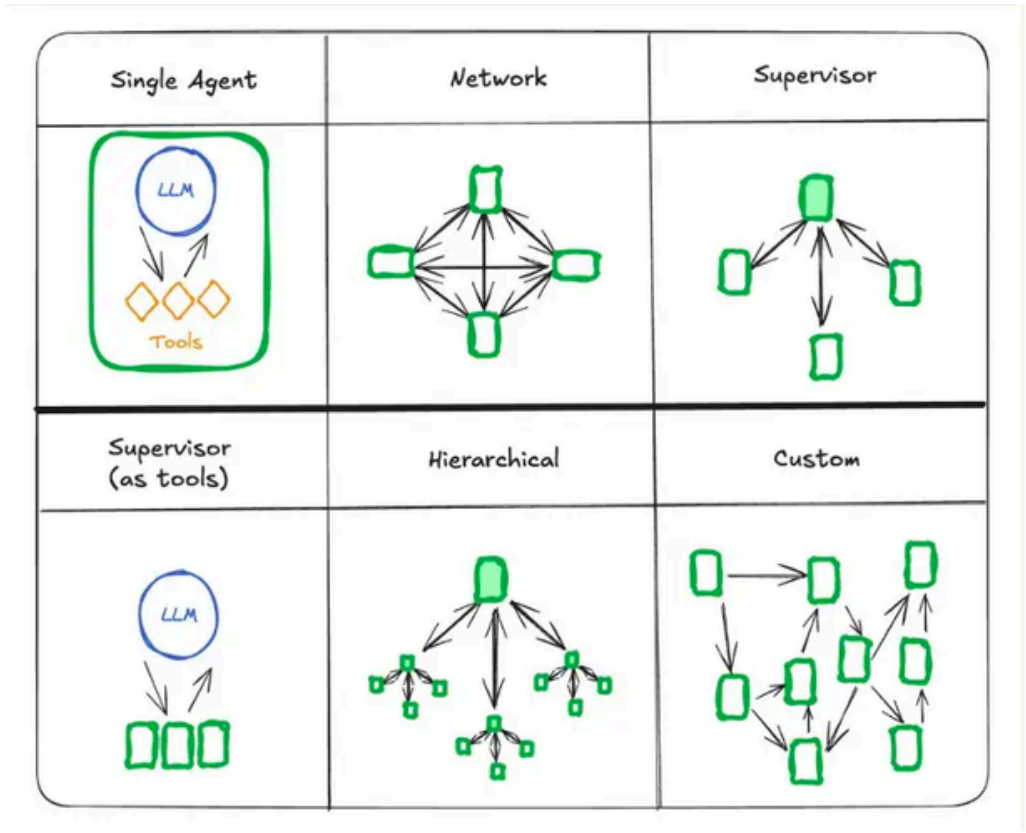
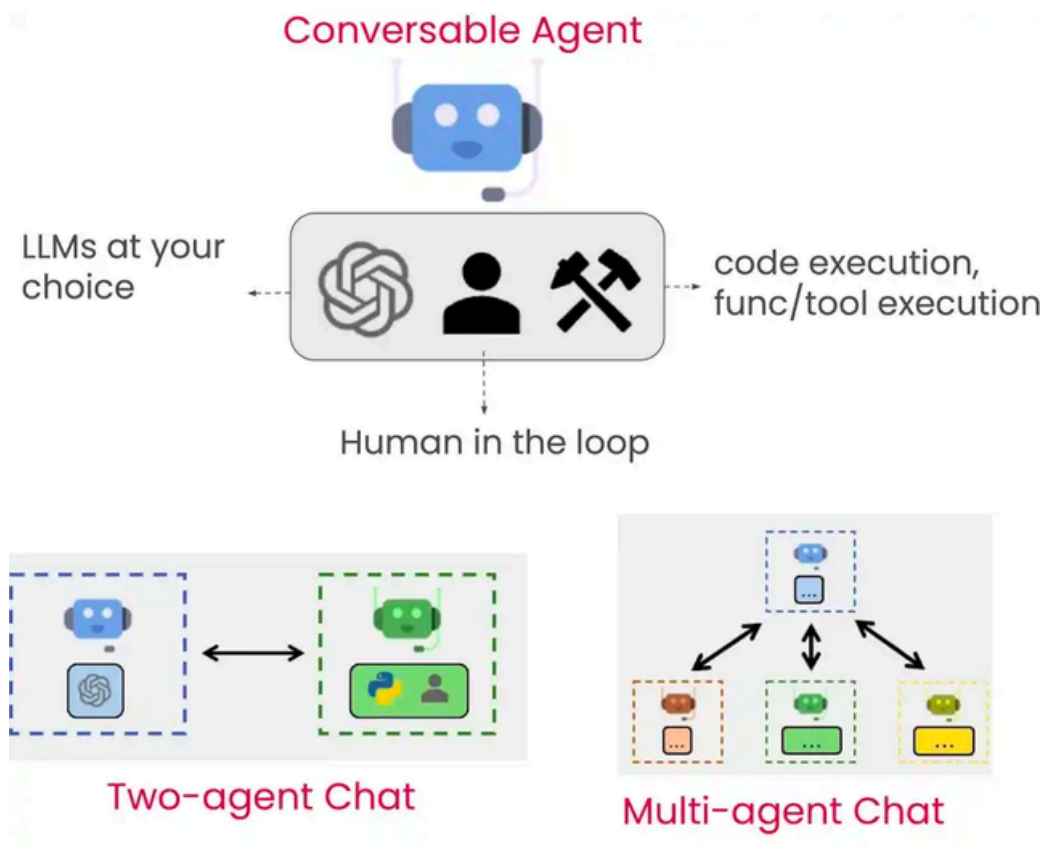
Analytics Vidhya

Day 9 of Mastering AI Agents

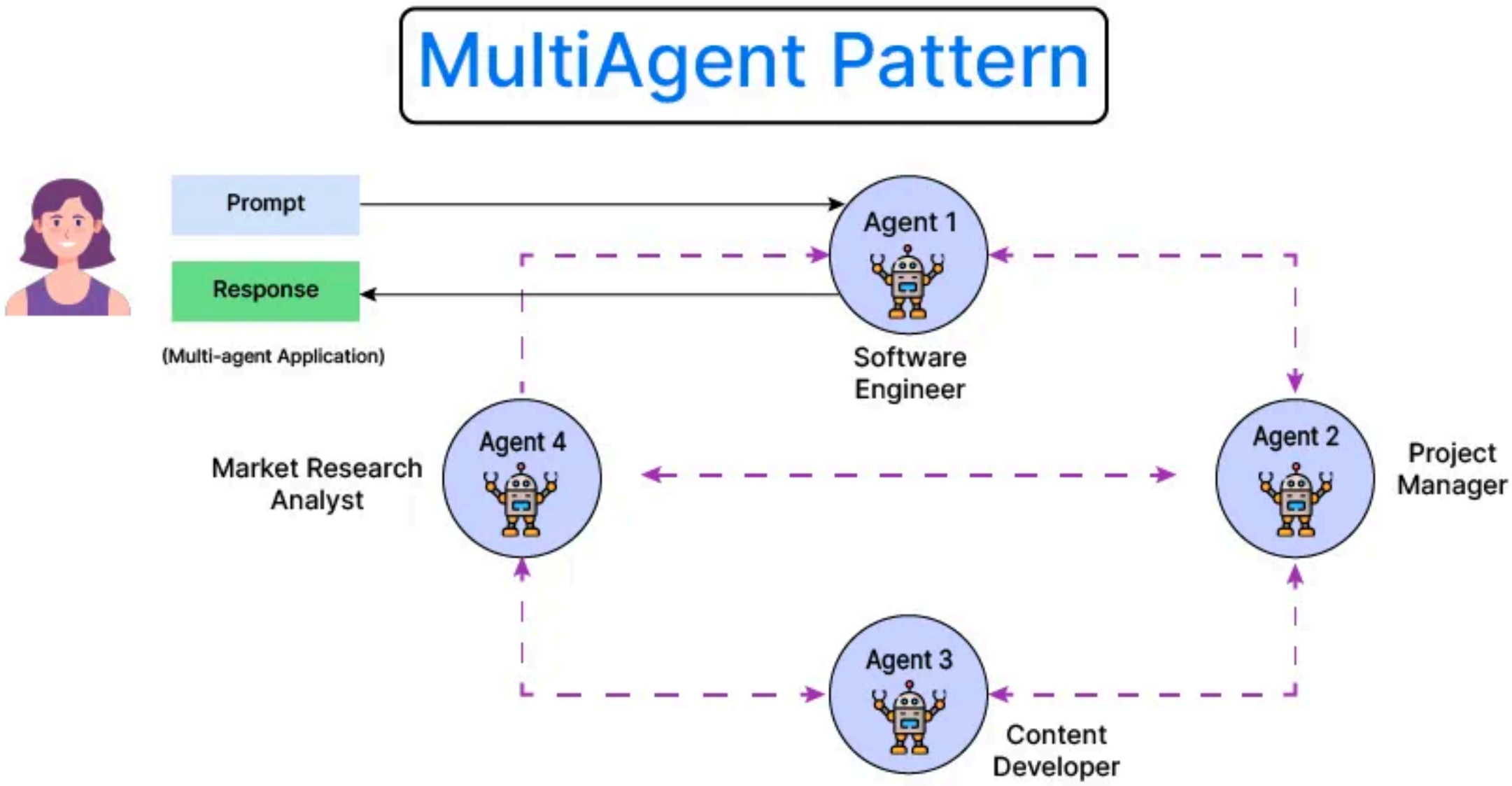
Agentic AI Multi-Agent Pattern







The Architecture



This architecture showcases an Agentic AI multi-agent system in which various agents with specialized roles interact with each other and with an overarching multi-agent application to process a user prompt and generate a response. Each agent in the system has a unique function, simulating a collaborative team working together to achieve a task efficiently.

Components Explained

User Interaction

- Prompt: The user initiates the interaction by inputting a prompt into the multi-agent application.
- Response: The system processes the prompt through collaborative agent interactions and returns a response to the user.

Agents and Their Roles

- Agent 1: Software Engineer: Focuses on technical problem-solving related to software development, providing coding solutions, or suggesting software-based strategies.

- Agent 2: Project Manager: Oversees the project management aspect, coordinating efforts among agents and ensuring the process aligns with overall project goals.

- Agent 3: Content Developer: Generates content, writes drafts, or assists in developing documentation and creative materials needed for the project.

- Agent 4: Market Research Analyst: Gathers data, conducts analysis on market trends, and provides insights that inform other agents' strategies.

Interaction Flow

- The arrows between agents signify communication channels and collaboration paths. This implies that:

    - **Bidirectional Arrows (double-headed)**: Agents can exchange information back and forth, enabling iterative collaboration.
    - **Dashed Lines**: Indicate secondary or indirect communication paths between agents, suggesting a support role in the communication flow rather than primary coordination.

Communication Workflow

- **Initiation**: The user provides a prompt to the multi-agent system.

- **Coordination**:
    - Agent 1 (Software Engineer) may start by determining any initial technical requirements or strategies.
    - Agent 2 (Project Manager) coordinates with Agent 1 and other agents, ensuring everyone is aligned.
    - Agent 3 (Content Developer) creates relevant content or drafts that may be needed as part of the output.
    - Agent 4 (Market Research Analyst) supplies research data that could be essential for informed decision-making by the other agents.

- **Completion**: Once all agents have collaborated, the system compiles the final response and presents it to the user.

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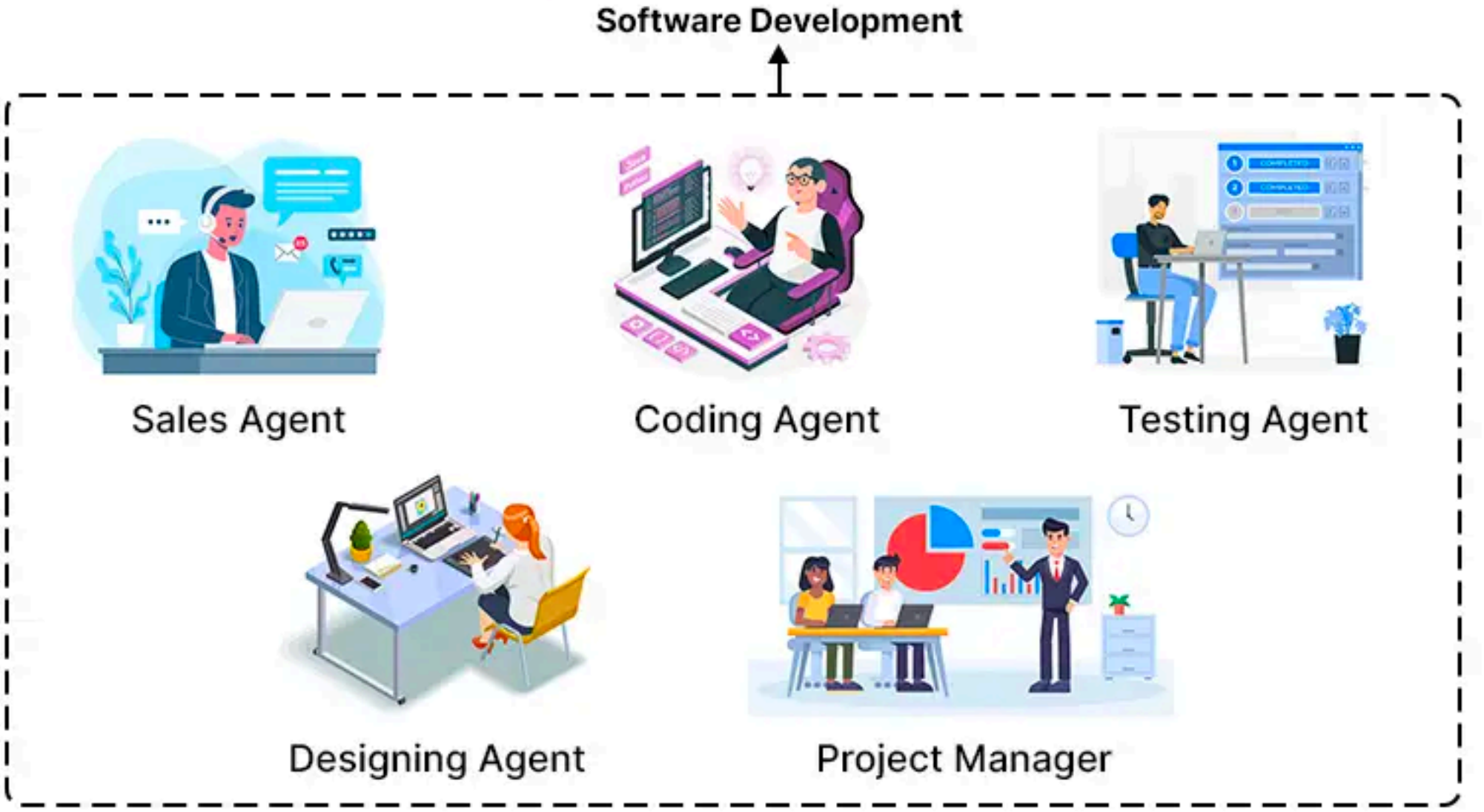

Key Characteristics

- **Collaborative Intelligence**: This architecture promotes collaborative problem-solving, where agents with specialized expertise contribute distinct insights and skills.
- **Autonomy**: Each agent operates semi-independently, focusing on their specific roles while maintaining communication with other agents.
- **Scalability**: The model can be expanded by adding more specialized agents to address more complex user prompts.

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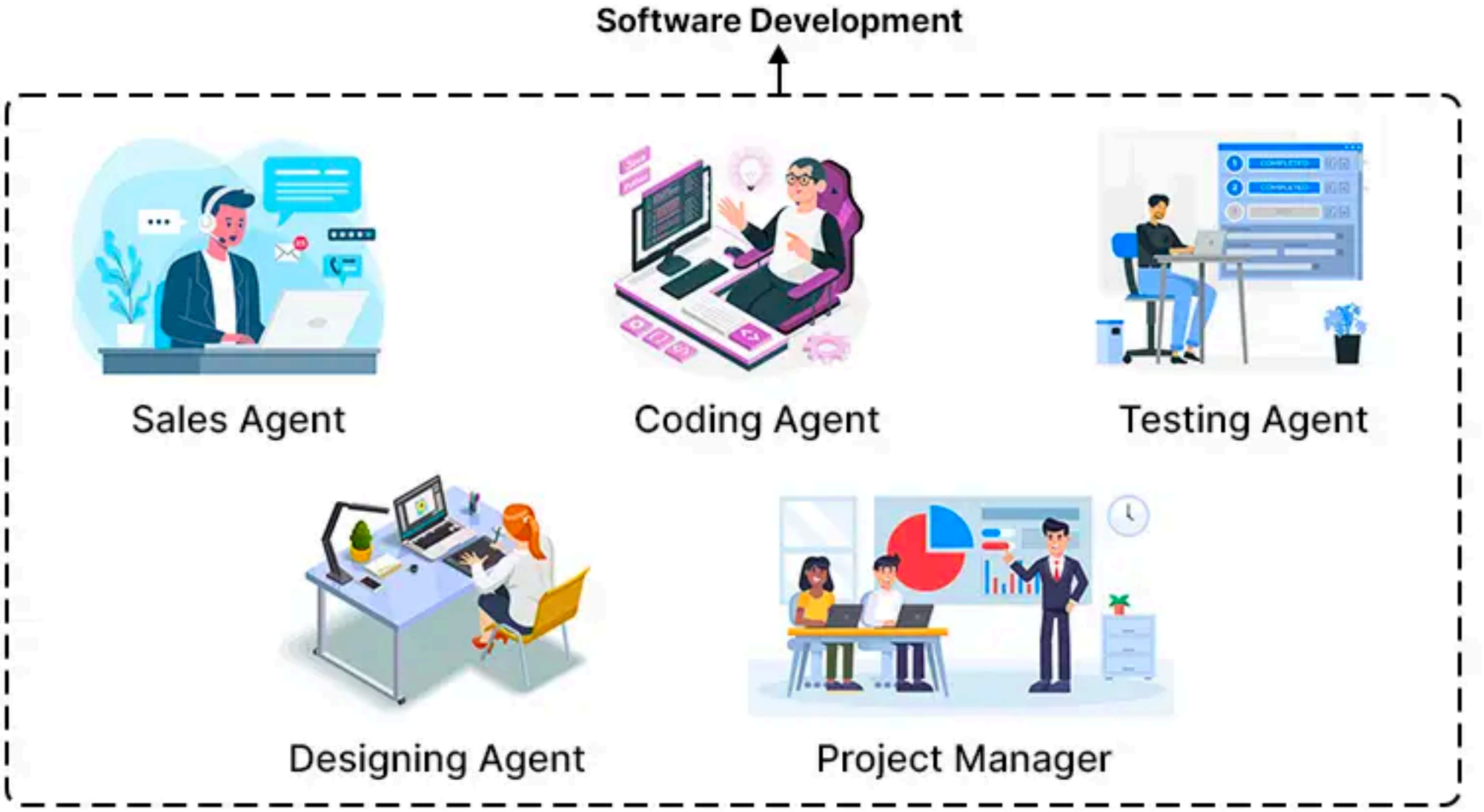

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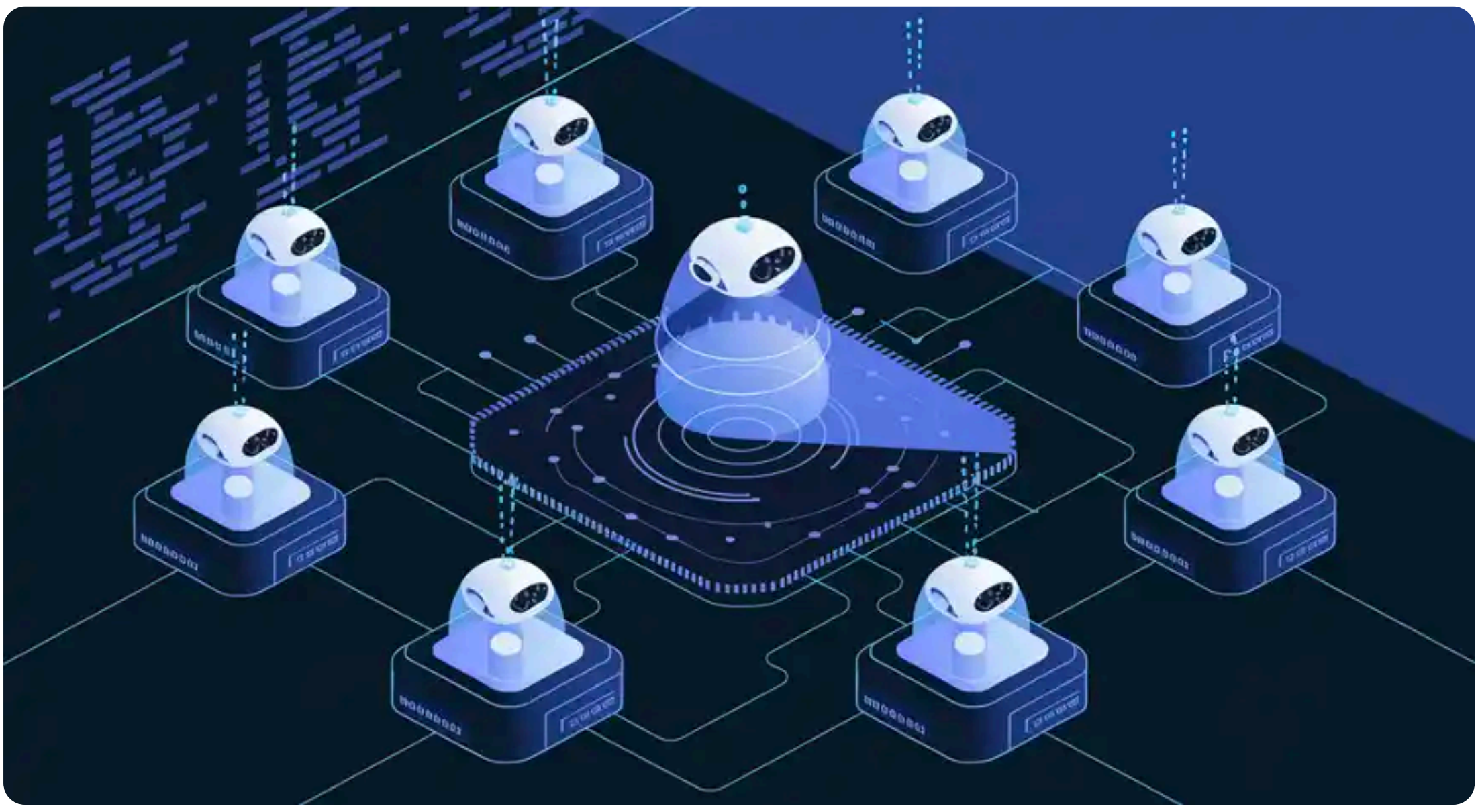
- This architecture is particularly effective in multifaceted tasks that require diverse expertise, such as research projects, product development, and comprehensive content creation. The emphasis on distinct roles and coordinated communication ensures that each part of a complex task is handled efficiently and cohesively. I hope you have understood how Multi-Agent works. Now, we will talk about a framework to build Multi-Agent solutions.

For more information, kindly visit this article



What is Agentic AI Multi-Agent Pattern?

Agentic AI Multi-Agent Pattern for building collaborative, efficient AI systems. Learn its benefits, frameworks & real-world applications.

Pankaj Singh 04 Apr, 2025