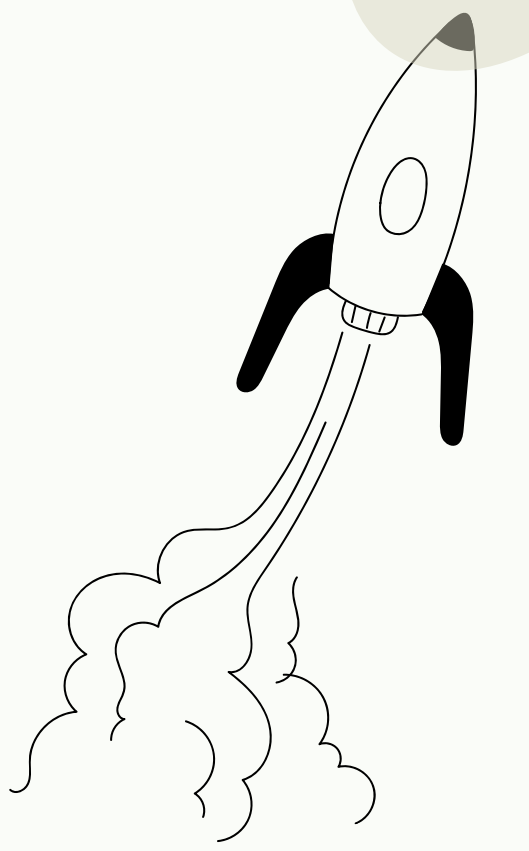
AGENTS Series

Essential Agentic Design Patterns: Building Smarter AI Agents



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Why Multi-Agent System?

A Multi-agent workflow uses subagent to manage tasks by dividing them into smaller, specialized agents. When an agent in overloaded, responsiblities are distributed among sub-agents for better efficiency.

- **Specialization & Separation of Concerns:** Each agent designed to focus on a specific domain, mirroring how human teams assign roles based on expertise.

- **Collaboration & Coordination:** Agents work together, sharing information and coordinating actions to achieve overarching business goals.

- **Modularity & Reusability**: Agents act as reusable building blocks that can be added, removed, or updated independently, without disrupting the entire system.

- **Operational Efficiency & Real-Time Response**: By processing tasks in parallel and allowing agents to make autonomous decisions. This is critical for applications such as supply chain management.

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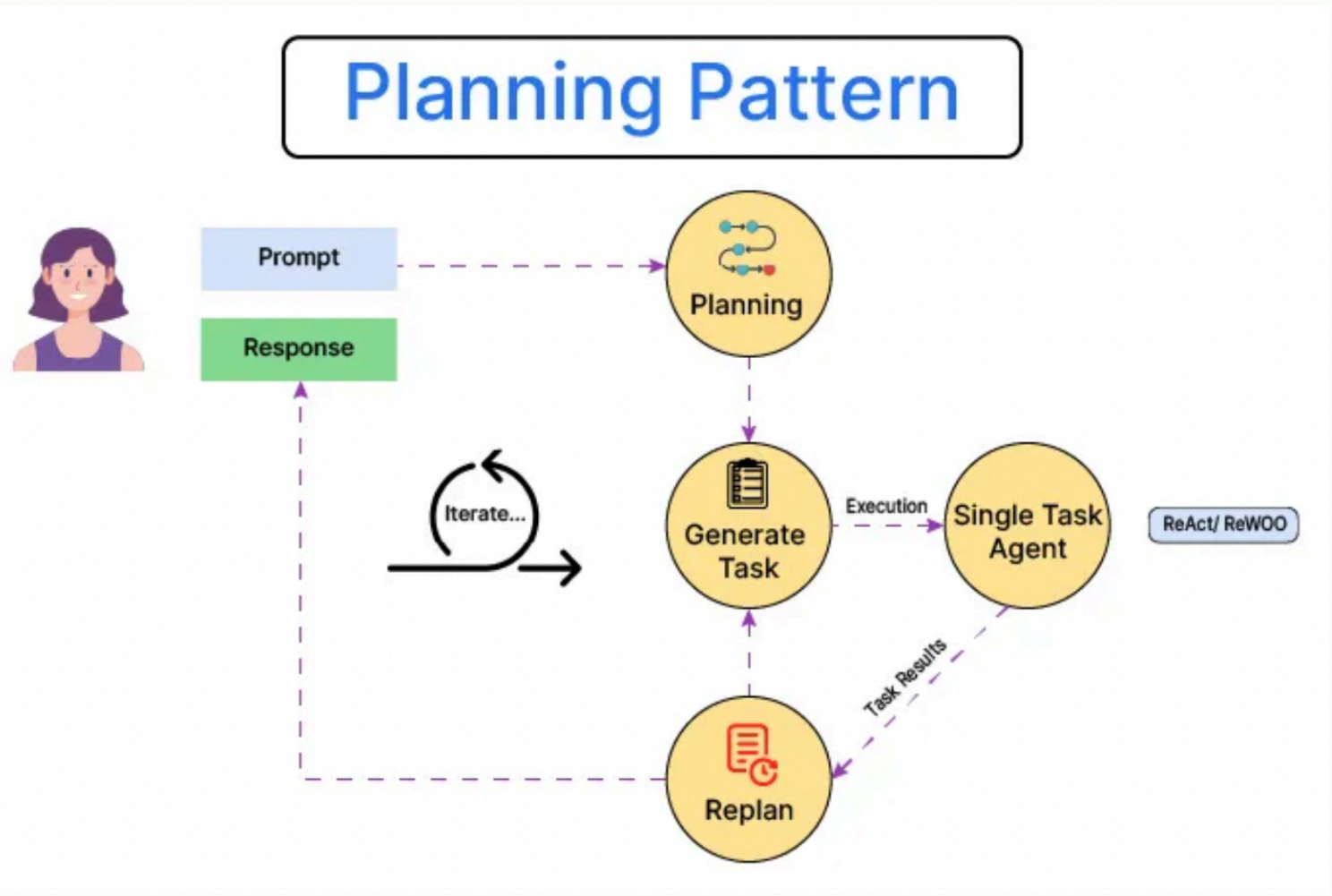
<Planning>

Planning enables an LLM-based agent to autonomously determine a sequence of steps to accomplish complex tasks.

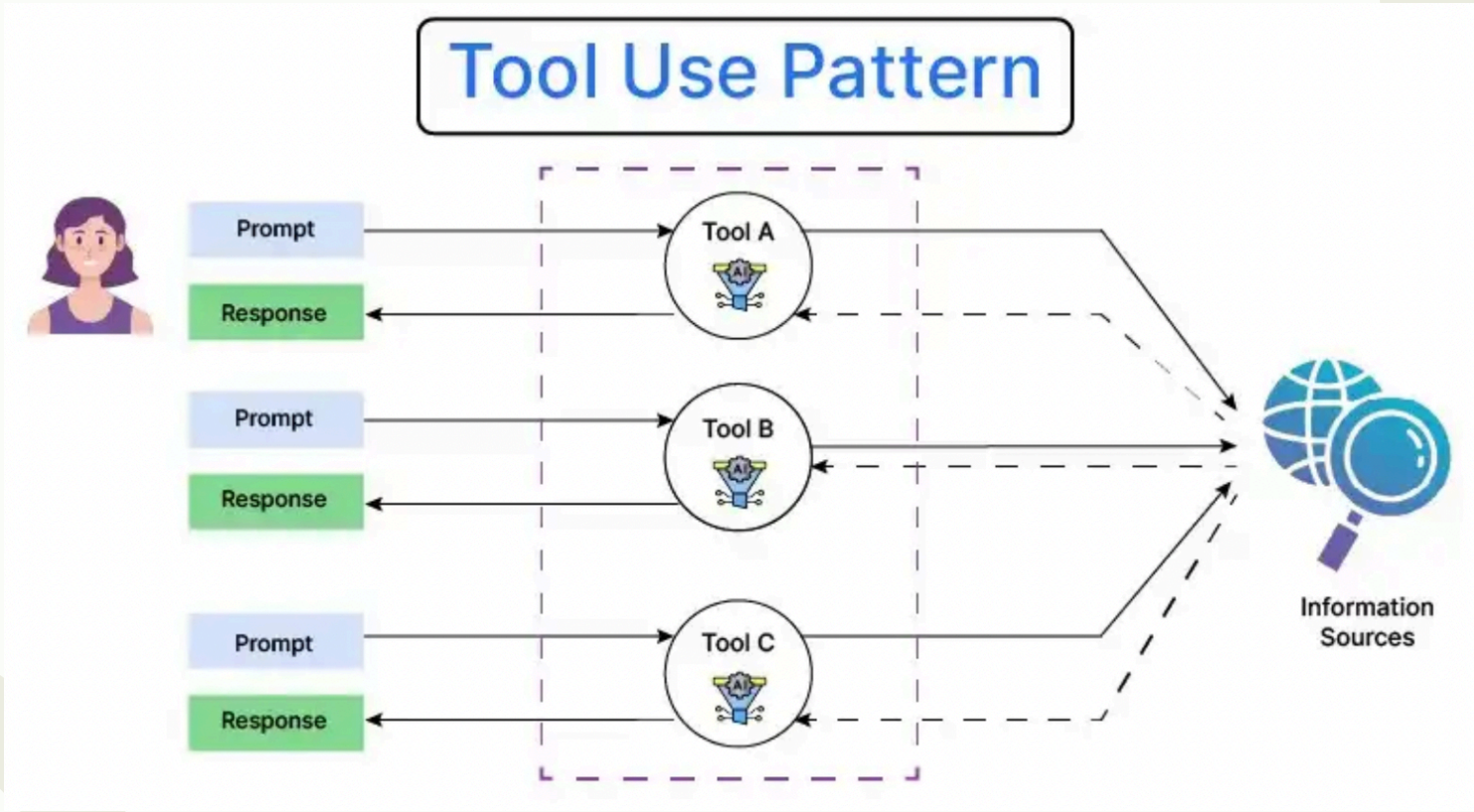


Given a research task, the agent may begin by breaking down the main topic into relevant subtopics, then proceed to search for information on each subtopic using appropriate tools.

After gathering the necessary data, it synthesizes the findings into a coherent summary or report, effectively completing the complex task through a dynamic, multi-step process.

<Tool Use>

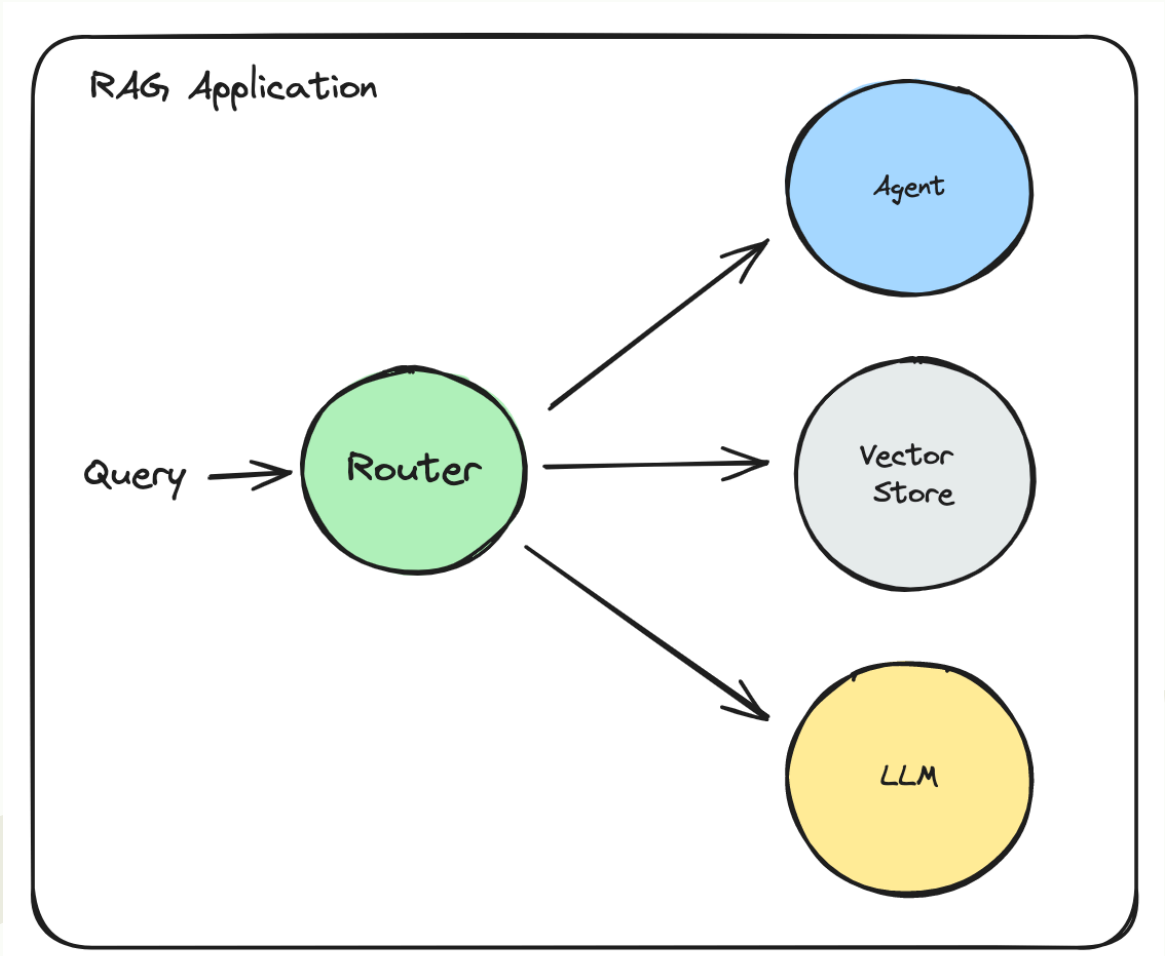
LLMs inherently tend to hallucinate due to their nature of predicting text word. Tool Use Pattern emphasizes equipping agents with external tools or APIs to extend their capabilities. This pattern allows agents to delegate specialized tasks rather than performing everything internally.



This includes searching the web or databases for up-to-date information, executing code, accessing productivity tools such as calendars and email for task management, and manipulating various types of content.

<Routing>

Agentic Routing is an advanced AI workflow technique that dynamically directs tasks or queries to the most appropriate AI agent or model based on real-time analysis and decision-making. It enables intelligent, conditional routing in multi-agent systems, optimizing efficiency, specialization, and accuracy in handling complex workflows.



Agentic routing enables dynamic, condition-based task execution by intelligently directing inputs to specialized agents or models, enhancing workflow efficiency and modular orchestration.

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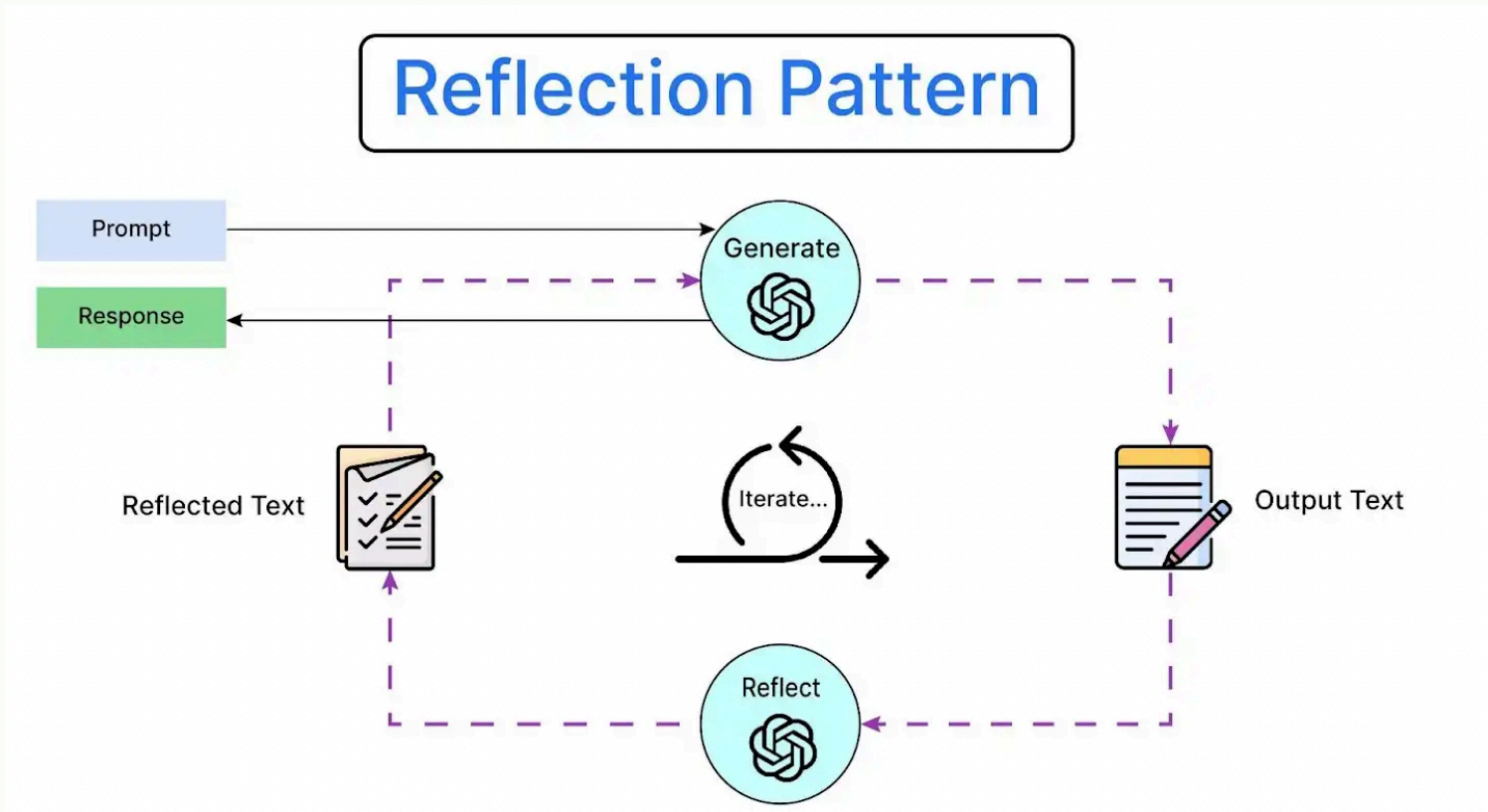
<Reflection>

The Reflection Pattern empowers agents to introspect and evaluate their actions or decisions. This pattern is about iterative improvement, where agents not only perform tasks but also analyze outcomes to refine their approach.



The Reflection Pattern is a powerful mechanism that enables intelligent agents to evaluate their own actions and continuously improve over time. At its core, this pattern emphasizes self-evaluation, where agents assess their performance using specific metrics or predefined goals. By implementing feedback loops, agents can iteratively adjust their strategies based on the outcomes of previous actions.

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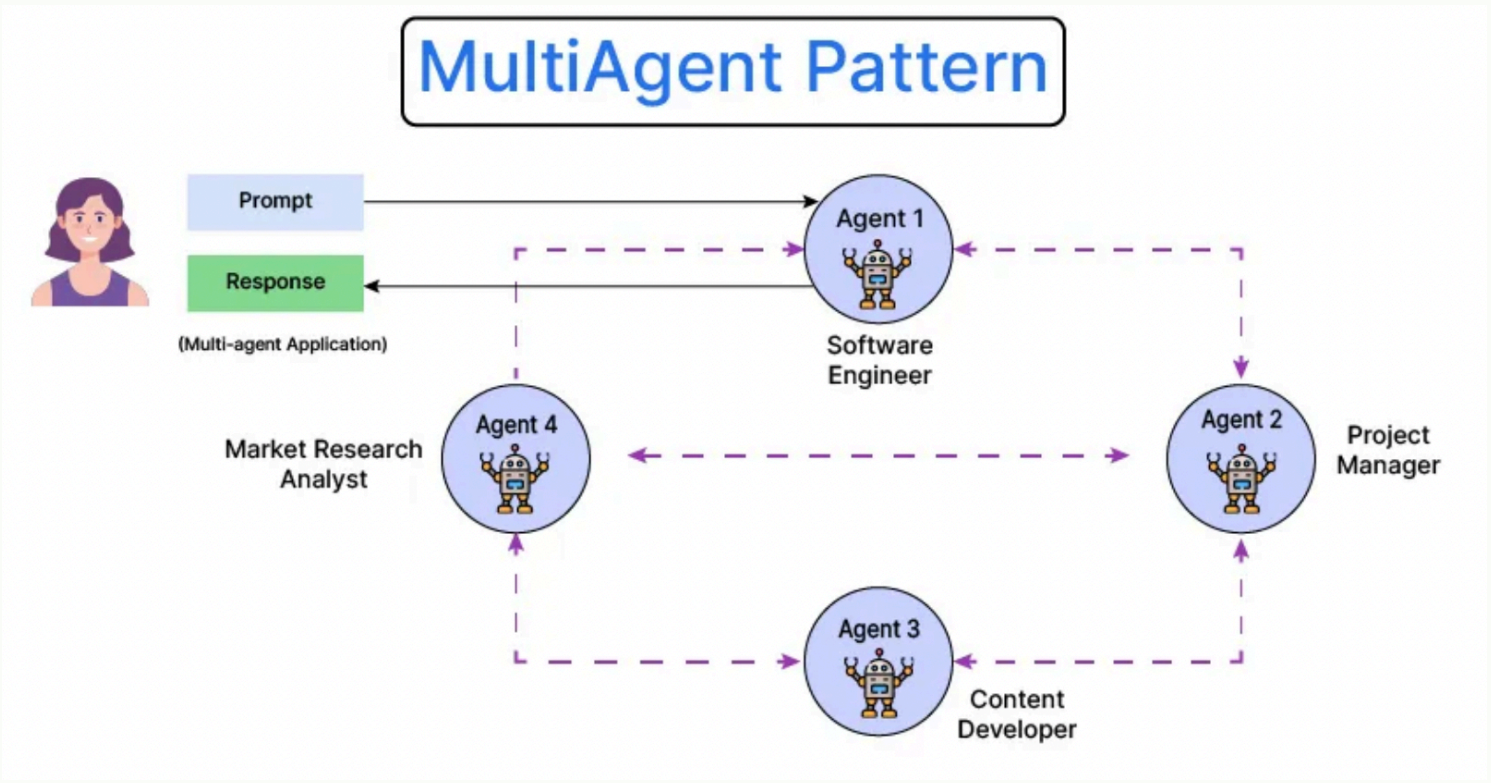
<Multi-agent>

The Multi-Agent Pattern focuses on orchestrating multiple agents to work collaboratively on complex tasks. This pattern leverages agent specialization and parallelism.



The Multi-agent Pattern involves dividing complex tasks among multiple specialized agents, each handling a specific aspect. This division of labor allows agents to focus on their strengths, improving efficiency and effectiveness. A key feature is coordination, where a central orchestrator manages the workflow to ensure all agents work in harmony toward a common goal.

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<Agentic Frameworks>

Frameworks commonly used to build AI agents and integrate with existing systems.

LangChain

LlamaIndex

LangGraph

crewai

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AutoGen

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