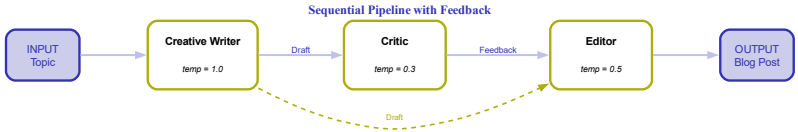
Multi-Agent Collaboration

What Is Multi-Agent Collaboration?



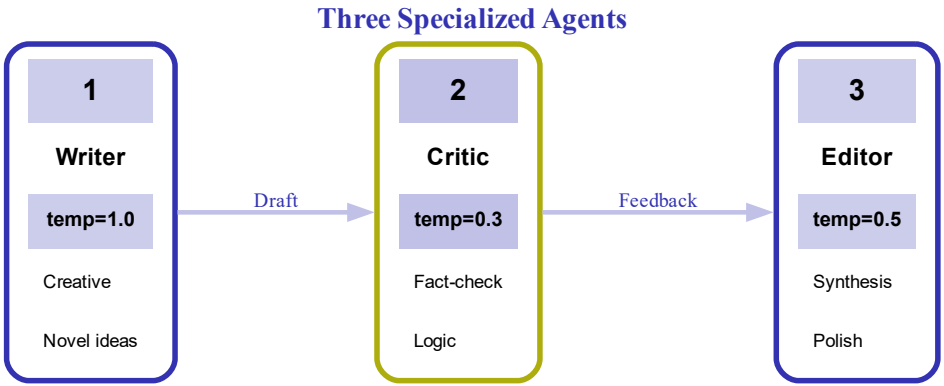
Key Concept: Multiple specialized AI agents working together, each optimized for a specific role.

Specialization through system prompts and temperature settings

Temperature Controls Behavior

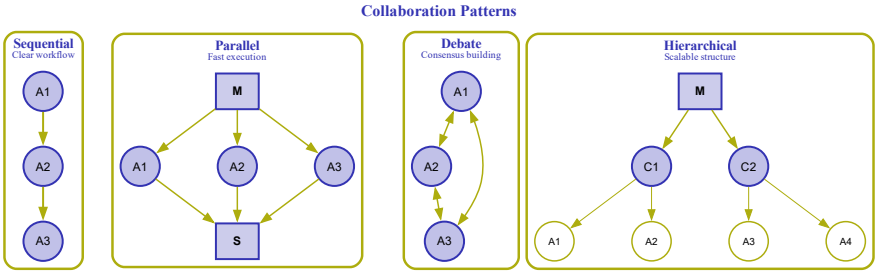
Temperature	Zone	Behavior
0.0-0.6	Analytical	Consistent, Reliable, Fact-focused
0.7-1.0	Creative	Novel ideas, Exploratory, Diverse

Different temperatures create distinct agent personalities from the same model



Each agent has unique temperature, role, and focus areas

Four Collaboration Patterns



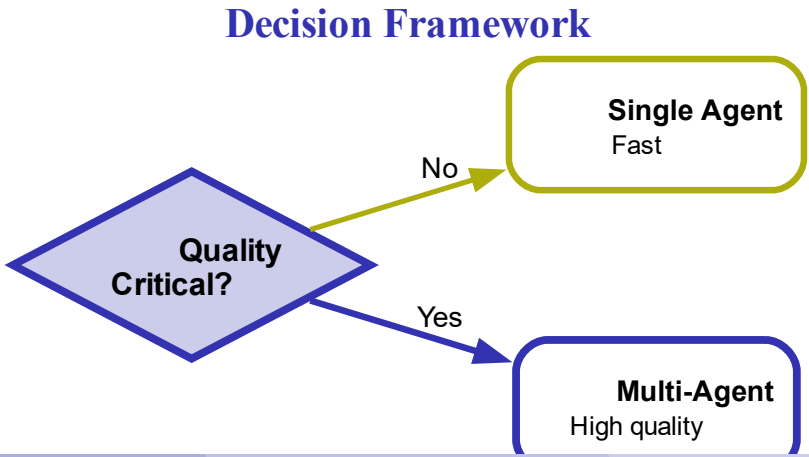
Pattern Selection:

- *Sequential:* Simple, quality-focused workflows
- *Parallel:* Independent tasks, speed priority
- *Debate:* Thorough exploration, error detection
- *Hierarchical:* Complex projects, scalability

Choose pattern based on task requirements and constraints

Quality Gains

Quality	Single Agent	Multi-Agent
Overall	Good	Excellent


Decision Framework
Quality Critical?
No
Single Agent
Fast
Yes
Multi-Agent
High quality

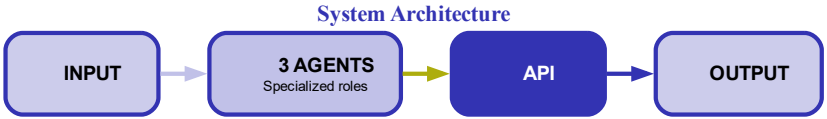
Decision Matrix: Which Approach to Use

When to Use Multi-Agent

		Task Complexity	
		Simple	**Complex**
Quality Needs	**High**	**Single Agent** Better prompts	**Multi-Agent** **RECOMMENDED**
	Low	**Single Agent** Simple prompt	**Single Agent** Chain prompts

Task complexity and quality needs guide the choice between single and multi-agent

Multi-Agent System Architecture



Key Components:

- Configuration layer (prompts, temperature, models)
- Specialized agents with distinct parameters
- Claude API for inference
- Cost tracking and monitoring

Clean separation: configuration, execution, and monitoring

Key Takeaways

Core Principles

1. Specialization via prompts and temperature
2. Quality vs cost trade-off is fundamental
3. Built-in review catches errors
4. Pattern choice matters

When to Use Multi-Agent

- High-stakes content
- Quality-critical tasks
- Budget allows
- Complex workflows

Implementation Tips

- Start with sequential patterns
- Test both approaches
- Monitor costs actively
- Optimize with model mixing

Next: Live Demo

- Jupyter notebook walkthrough
- Real-time execution
- Cost tracking
- Output comparison
- Interactive exploration

Ready for hands-on demonstration: multi_agent_blog_writer_fixed.ipynb