Multi-Agent vs Single-Agent Approach

The multi-agent strategy employed in this project offered a distinct structural benefit compared to a theoretical single-agent system by promoting role specialization and regulated reasoning processes. Every agent received a unique task; intent classification, policy retrieval, empathy, resolution, escalation, and quality review; reflecting the structure of actual customer service teams.

This division lessened cognitive burden on individual agents and enhanced dependability, as every interaction phase concentrated on a specific, clearly defined task. Conversely, a single-agent system must concurrently identify intent, enforce policy, regulate tone, execute actions, and conduct self-verification, thereby raising the chances of flawed reasoning, fabricated policies, or unsafe behaviors. Another significant benefit of the multi-agent framework was guided orchestration and collective state handling. The Supervisor agent managed the sequence in which agents performed, maintained a common context (user message, knowledge base, and intermediate results), and imposed a termination condition when the task was finished. This enhanced the system's transparency and auditability, since intermediate choices were displayed in the transcript. In a single-agent system, internal logic and decision limits would be unclear, complicating the process of identifying errors or proving adherence to safety and policy standards.

Ultimately, the addition of reflection and human-in-the-loop elements greatly enhanced the safety and reliability of the system. The Quality Reviewer agent served as a last checkpoint, assessing politeness, compliance with policies, and clarity before providing the final response to the customer. Sensitive actions like refunds were deliberately simulated instead of being automatically processed, permitting human approval when necessary. A single-agent method would have difficulty reliably evaluating its own results, while the multi-agent structure incorporated a clear feedback mechanism that minimized risk and enhanced response quality. In general, the multi-agent structure provided improved robustness, clarity, and real-world relevance compared to a standalone single-agent option