

Static Planning vs. Reflective Dynamic Planning Agentic AI Systems

Dipanjan Sarkar

Head of Community & Principal AI Scientist at Analytics Vidhya

Google Developer Expert - ML & Cloud Champion Innovator

Published Author

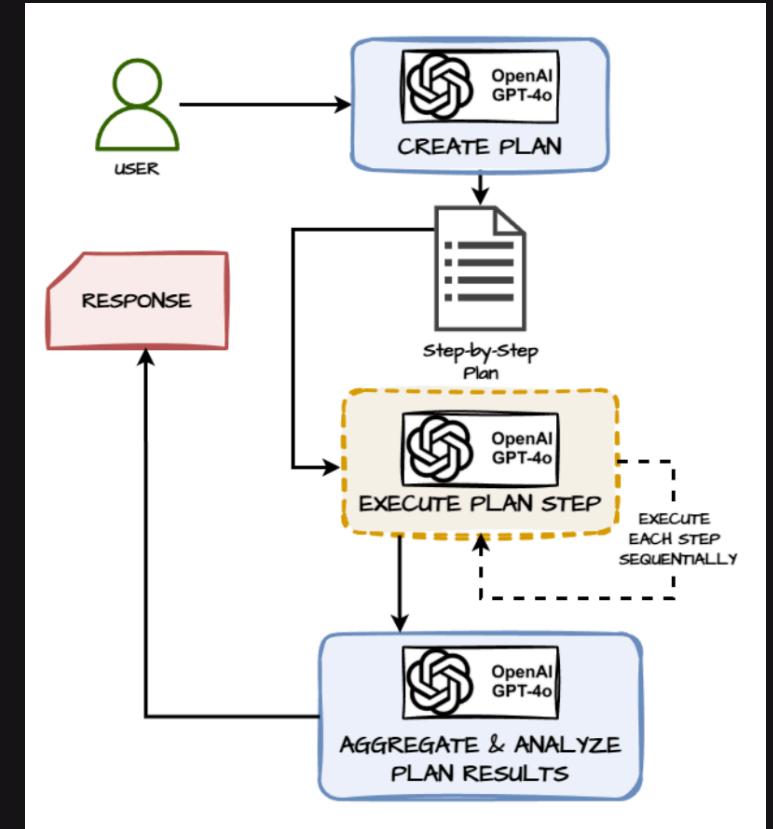


Planning Agentic AI Systems

The system creates a detailed step-by-step plan for a user request and executes each step in sequence.

Workflow

- Plan Creation
 - The AI generates a sequential task plan based on the user query.
- Task Execution
 - Each step is executed one at a time, following the defined order.
- Result Aggregation
 - The outcomes of each step are compiled and analyzed to generate a final result.
- Final Response
 - The final generated response is returned to the user.

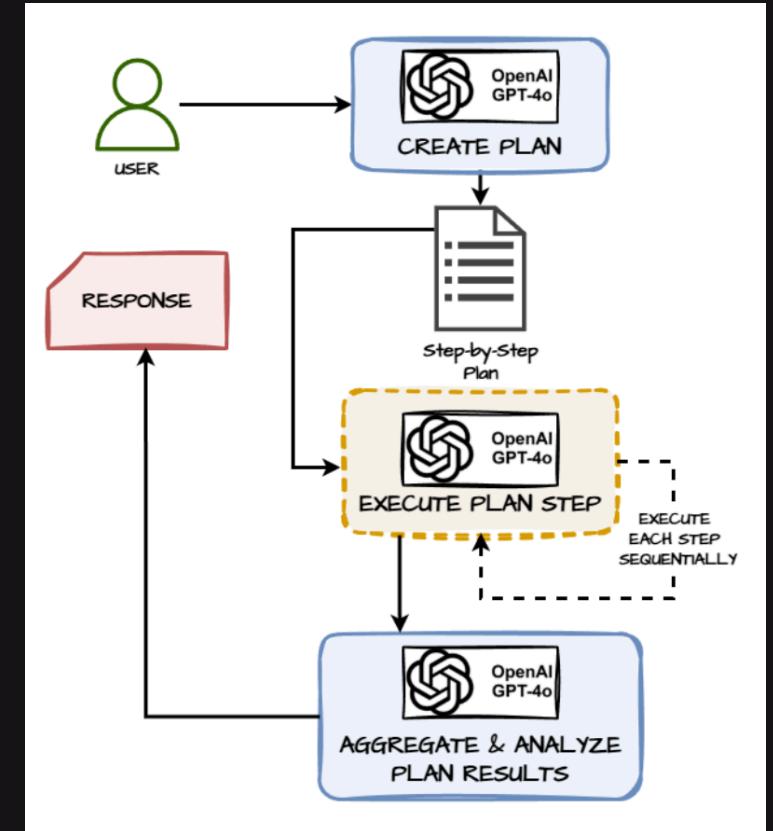


Planning Agentic AI Systems

The system creates a detailed step-by-step plan for a user request and executes each step in sequence.

Advantages

- Ensures steps are executed in the correct order.
- Suitable for tasks where outputs from earlier steps are required for later steps.

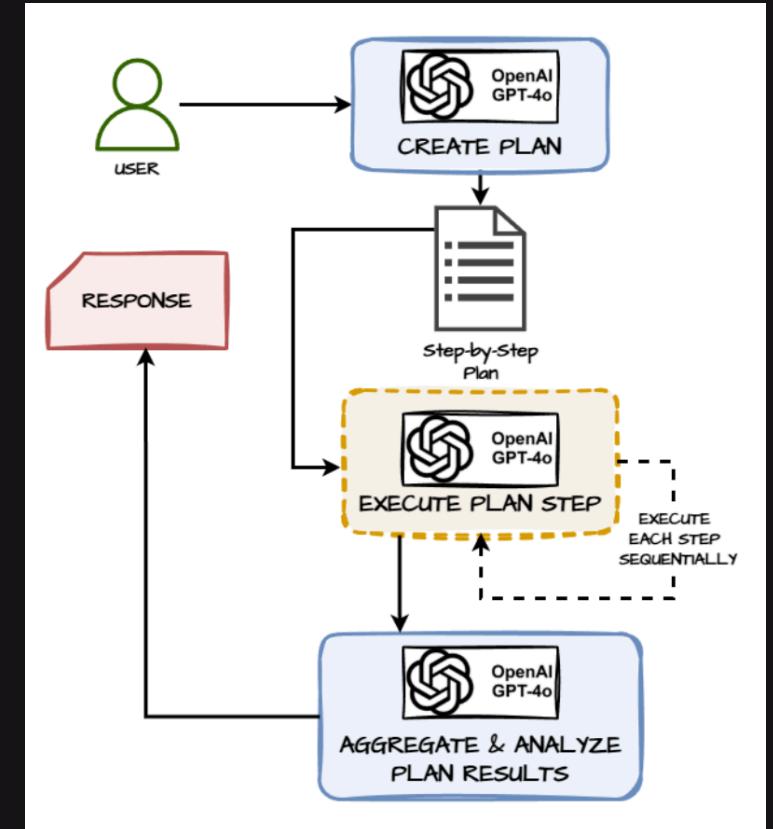


Planning Agentic AI Systems

The system creates a detailed step-by-step plan for a user request and executes each step in sequence.

Limitations

- Slower execution as tasks are processed sequentially.
- It is not ideal for tasks that can be handled independently.

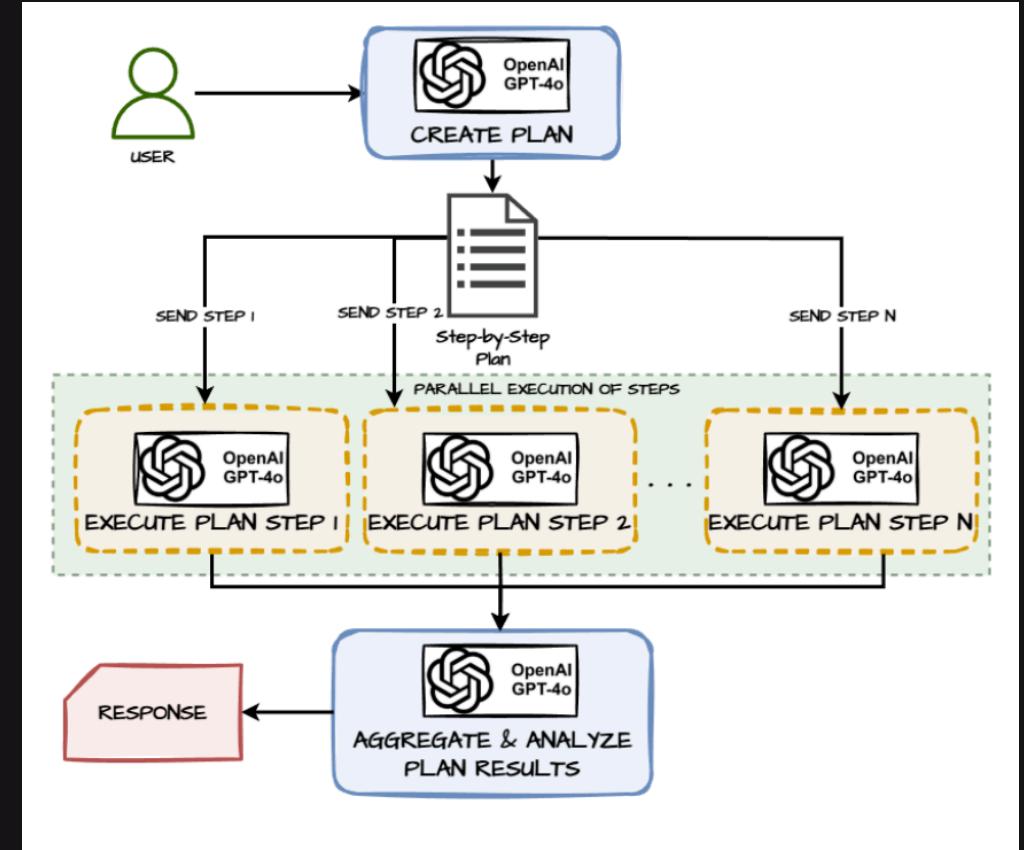


Static Planning Agentic AI Systems with Parallel Execution

The system creates a static plan but executes steps simultaneously to improve efficiency.

Workflow

- Plan Creation
 - The AI generates a task plan with steps that can be executed in parallel.
- Task Execution
 - Multiple steps are processed concurrently by different agent nodes or sub-agents.
 - Steps are independent and do not require sequential dependencies.
- Result Aggregation
 - The outputs from parallel tasks are combined and analyzed.
- Final Response
 - The final generated response is returned to the user.

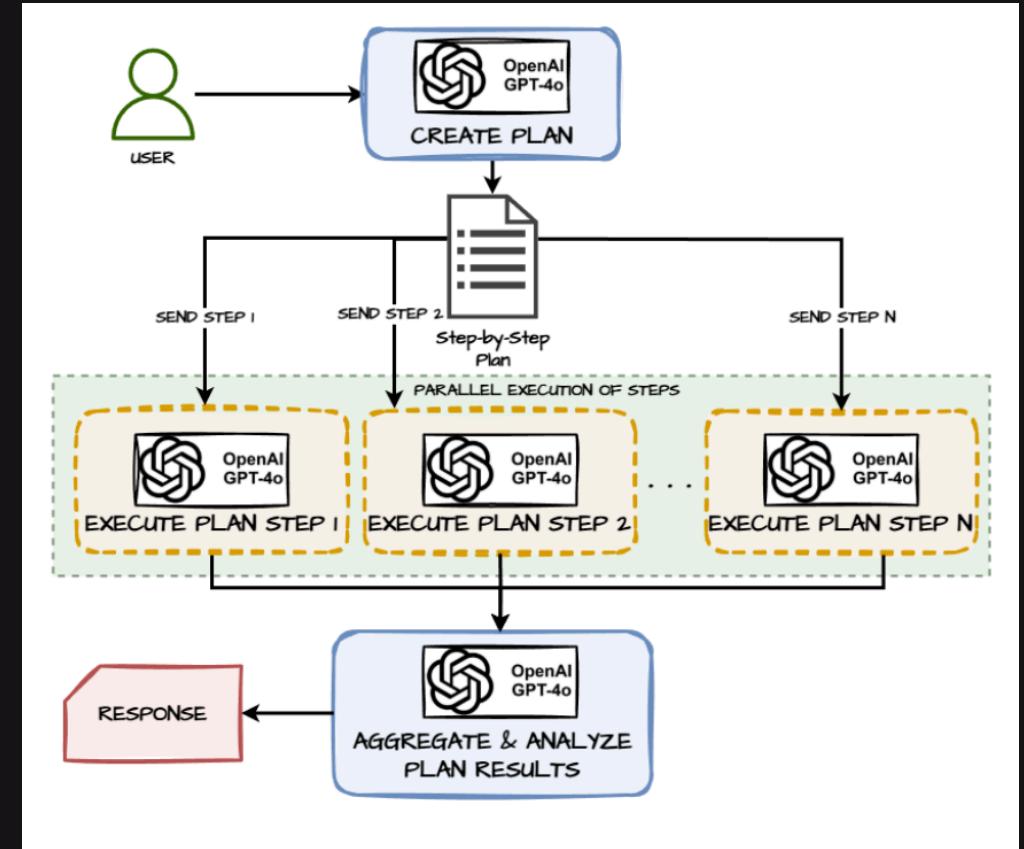


Static Planning Agentic AI Systems with Parallel Execution

The system creates a static plan but executes steps simultaneously to improve efficiency.

Advantages

- Faster task completion due to simultaneous execution.
- Ideal for independent or modular tasks.

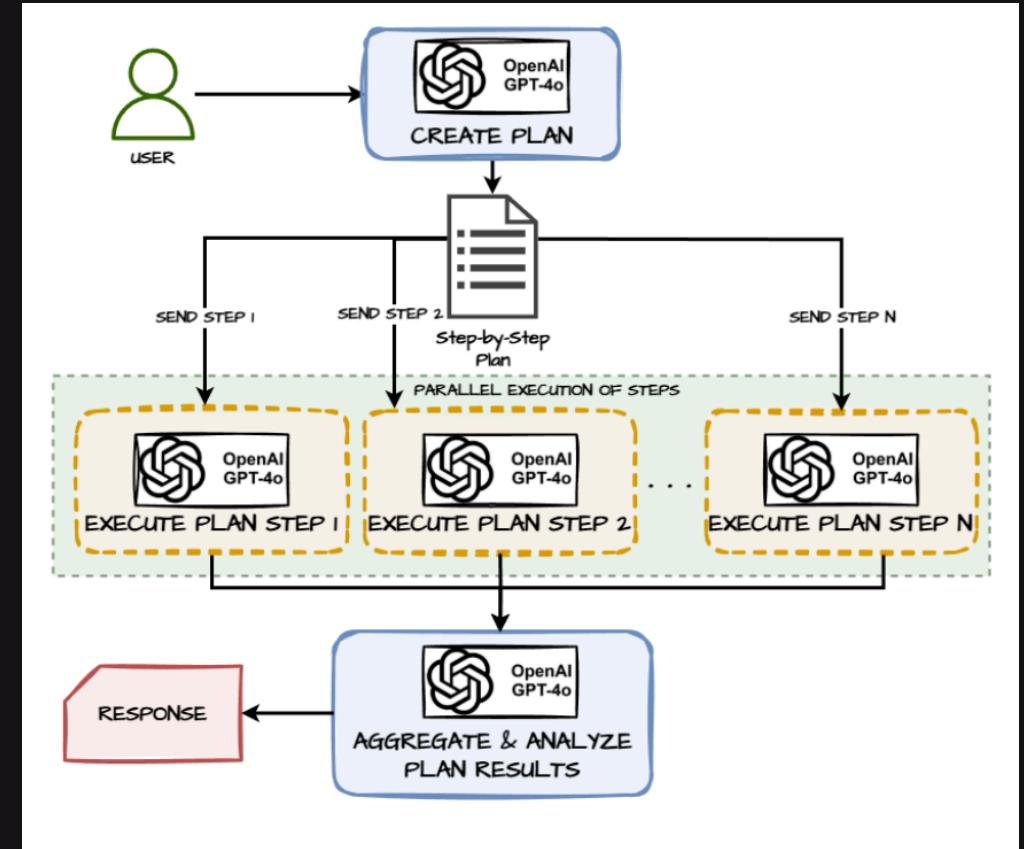


Static Planning Agentic AI Systems with Parallel Execution

The system creates a static plan but executes steps simultaneously to improve efficiency.

Limitations

- Requires tasks to be independent; dependencies can complicate execution.
- Increased complexity in managing parallel processing.

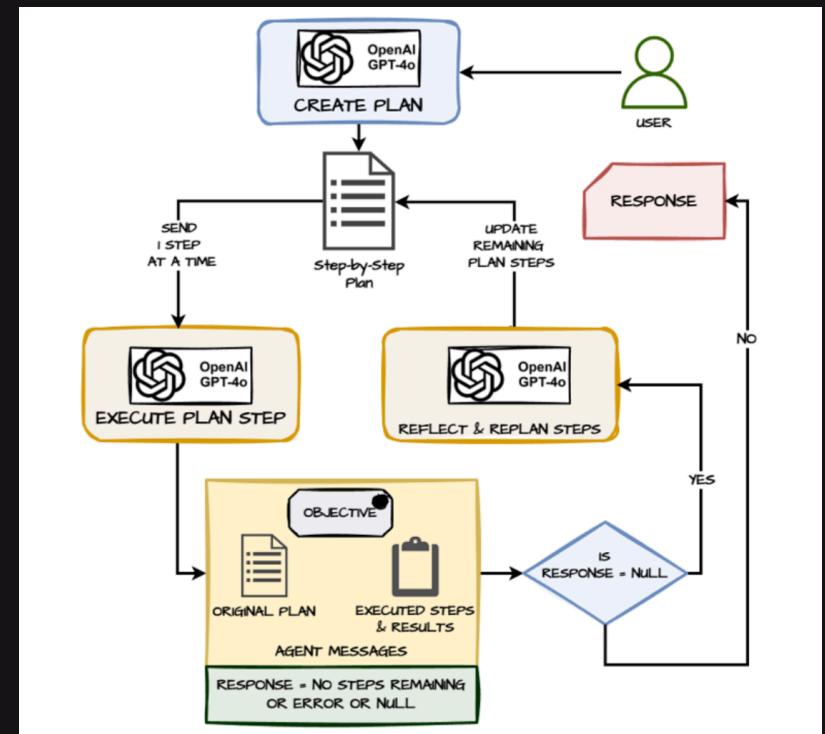


Reflective Dynamic Planning Agentic AI Systems

The system uses a combination of planning and reflection to execute plan steps, send the results to an LLM for further reflection and replan the remaining steps if needed till we get to the final response generation.

Workflow

- Plan Creation
 - The AI generates an initial step-by-step plan for task execution.
 - The plan is dynamic and can change based on intermediate step results.
- Step-by-Step Execution
 - Tasks are executed sequentially, with results feeding back into the system for further replanning.
- Reflection and Replanning:
 - After each step, the system evaluates executed steps and results and adjusts the remaining plan dynamically.
 - Handles unexpected scenarios by recalculating or changing steps as needed.

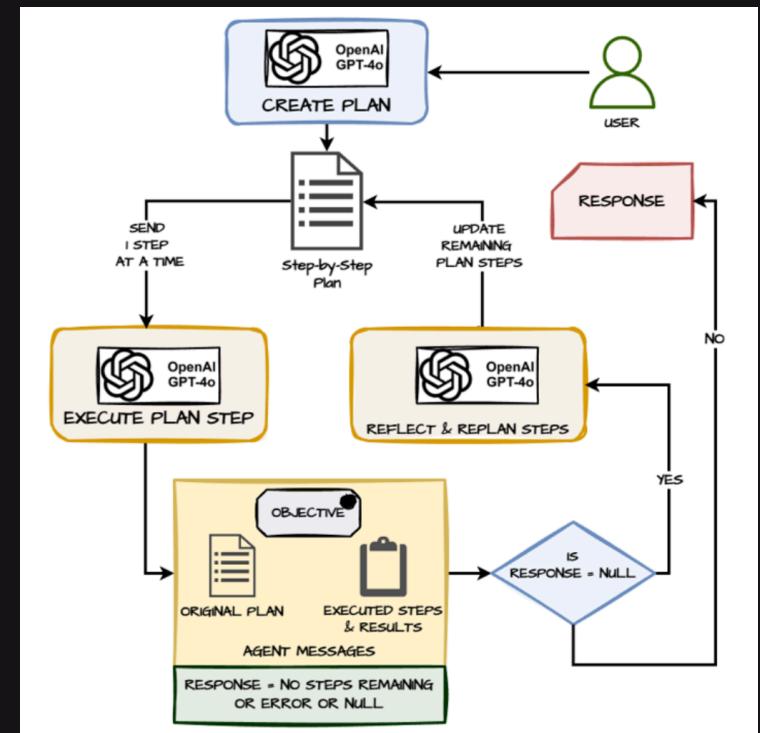


Reflective Dynamic Planning Agentic AI Systems

The system uses a combination of planning and reflection to execute plan steps, send the results to an LLM for further reflection and replan the remaining steps if needed till we get to the final response generation.

Workflow

- **Reflection and Replanning**
 - After each step, the system evaluates executed steps and results and adjusts the remaining plan dynamically.
 - Handles unexpected scenarios by recalculating or changing steps as needed.
- **Objective Tracking**
 - Keeps a record of the original plan, executed steps, and results to ensure alignment with the user's goal.
- **Final Response**
 - If all steps are completed or there was an error, returns the final response.

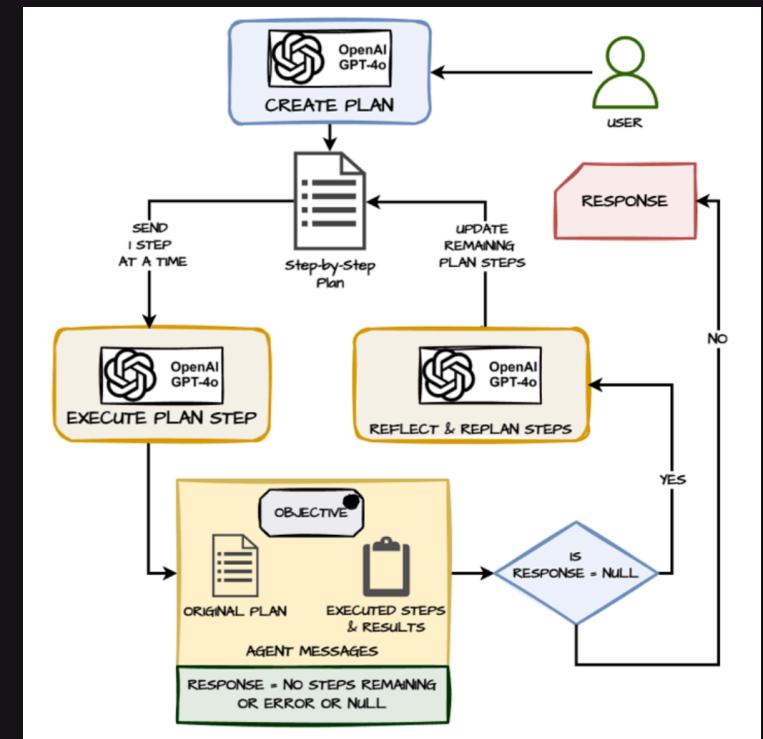


Reflective Dynamic Planning Agentic AI Systems

The system uses a combination of planning and reflection to execute plan steps, send the results to an LLM for further reflection and replan the remaining steps if needed till we get to the final response generation.

Advantages

- Adaptive Workflow
 - Dynamically adjusts tasks based on progress or changing requirements.
- Reflect & Iterate
 - Capable of looking at already executed steps to update the plan iteratively and dynamically instead of sticking to a static fixed plan.
- Goal-Oriented
 - Maintains focus on achieving the desired objective, by sticking to it in the plan execution, reflection and replanning steps

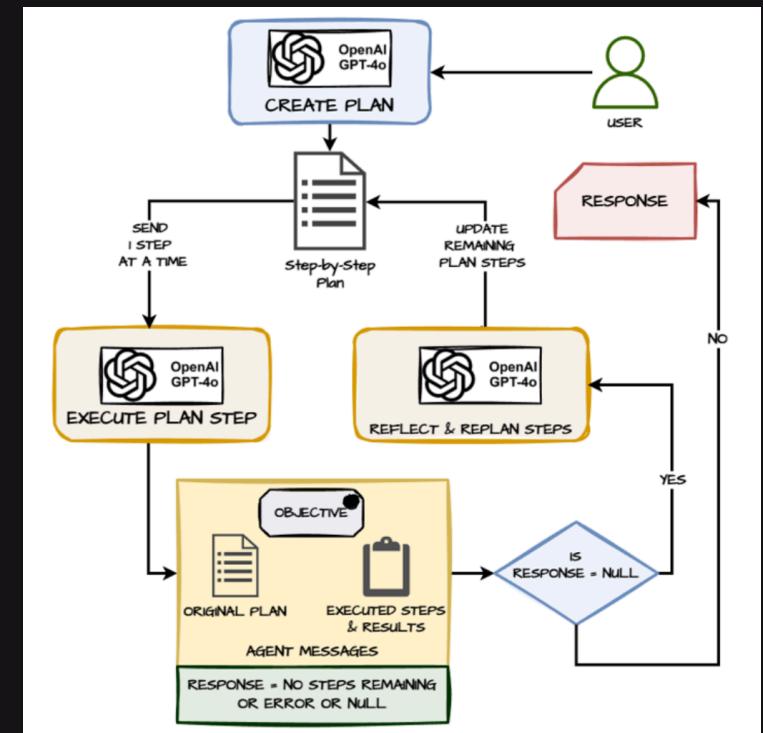


Reflective Dynamic Planning Agentic AI Systems

The system uses a combination of planning and reflection to execute plan steps, send the results to an LLM for further reflection and replan the remaining steps if needed till we get to the final response generation.

Limitations

- Execution Time
 - Reflection and replanning may increase overall time for task completion.
- Resource Intensive
 - Requires additional computational resources to continuously evaluate and adjust plans.



Thanks