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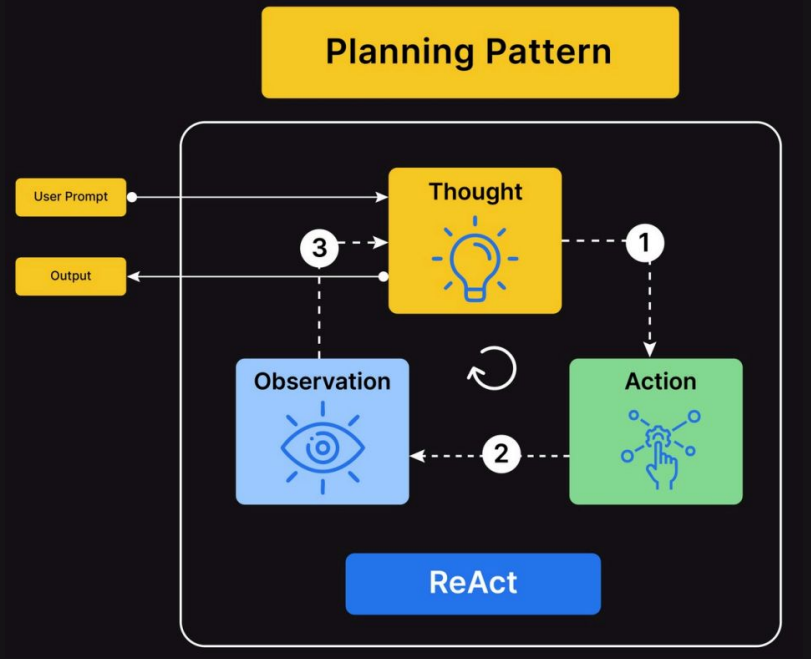
Introduction to the Planning Pattern

Created by:
Eleni Verteouri
Gen AI Tech Lead @ UBS

Created & Narrated by:
Dipanjan Sarkar
Head of Community & Principal AI Scientist @ Analytics Vidhya
Google Developer Expert - ML & Cloud Champion Innovator
Published Author

What is the Planning Pattern?

The **Planning Pattern** is a design framework that enables AI systems to structure and execute multi-step tasks by reasoning, acting, and adapting in real time.



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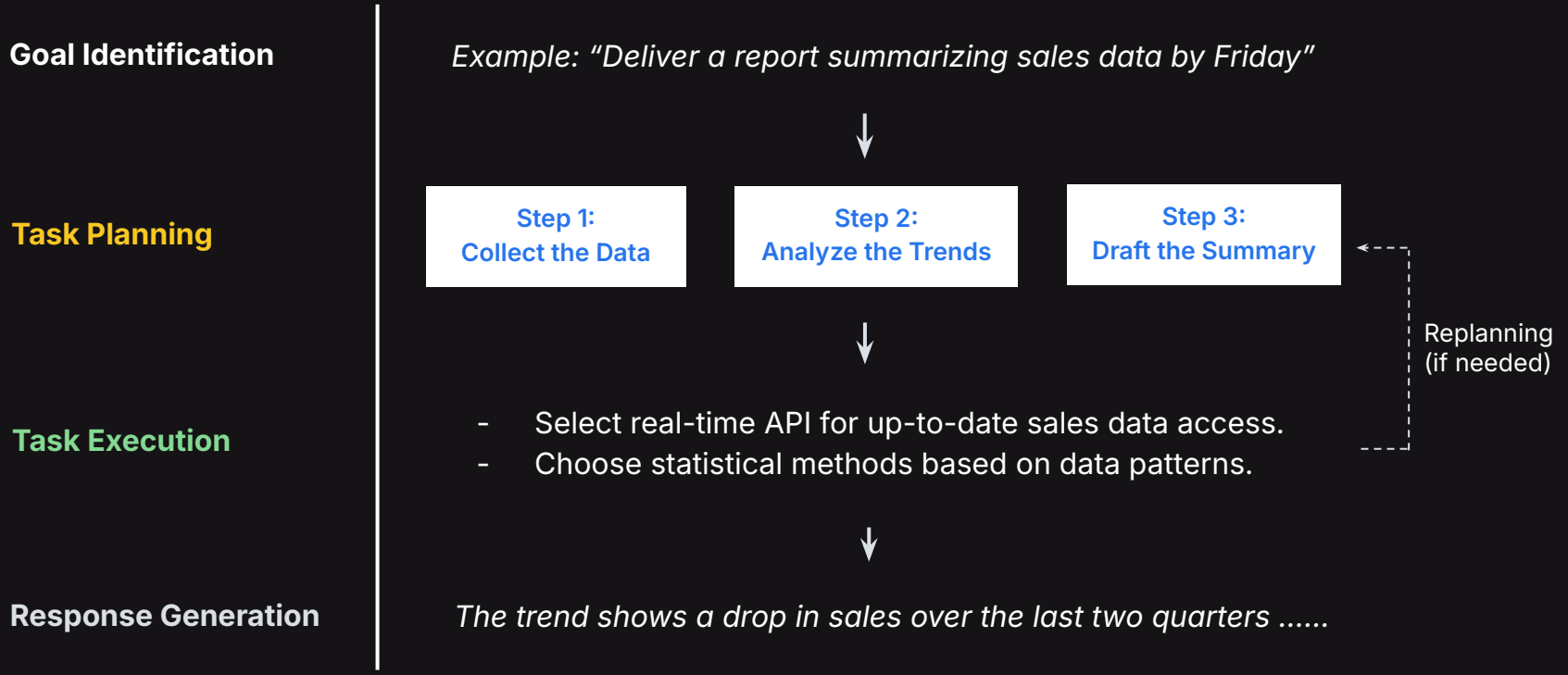
Key Components of the Planning Pattern



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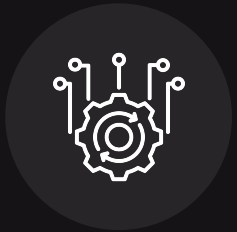
What is Task Planning?

Task planning in AI agents is the process of transforming high-level goals into actionable, structured steps that agents can autonomously execute, adapt, and refine, ideally with a timeline.

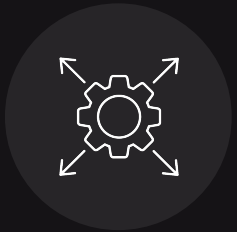


Autonomy:

Empowers agents to handle complex, multi-step workflows without human intervention.

Adaptability:

Allows agents to re-prioritize and adjust in real time.



Scalability:

Structures workflows for agents operating in diverse and dynamic environments.

What Happens During Task Planning??

Task planning is not just about setting goals — it involves generating, sequencing, and adapting actionable steps that AI agents can execute autonomously.

The steps are as follows:

1

Understand User Query or Task

2

Generate Plan of Sub-tasks

3

Regenerate or Replan Sub-tasks (optionally based on feedback)

What is Task Execution?

Task execution is the phase when AI agents perform concrete actions using tools, reasoning, and outputs from previous steps to progress toward the objective.

Tool Use:
Calling APIs, search engines, or external tools to fetch or process new information.

Step Chaining:
Taking outputs from earlier tasks or sub-tasks and using them as inputs for the next action.

LLM Reasoning:
Using the LLM's internal logic to synthesize, refine, or generate outputs like summaries, plans, or code.

Adaptive Execution:
Reacting to unexpected results and dynamically adjusting steps in real time.

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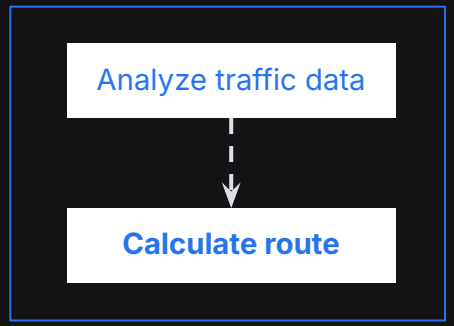
Types of Task Execution: Sequential Execution

In **Sequential Execution** tasks are executed step-by-step, with each task dependent on the completion of the previous one.

When to Use:

- Workflows with dependent subtasks that might rely on previous executed task outputs
- Scenarios demanding precision and replanning based on executed tasks



Slower with Sequential Execution

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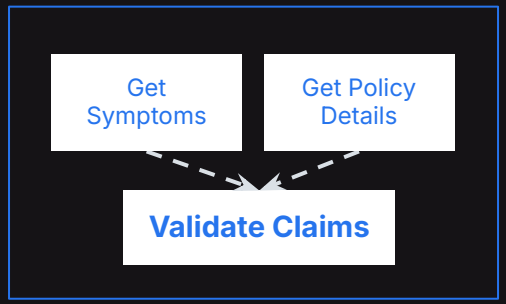
Types of Task Execution: Concurrent Execution

In **Concurrent Execution** tasks are performed in parallel, enabling faster completion of independent or loosely coupled tasks.

When to Use:

- Workflows with independent subtasks that don't rely on shared resources or task outputs.
- Scenarios demanding time efficiency.



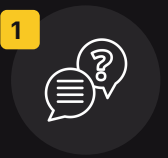
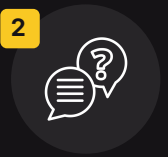
Faster with parallel execution

Comparison of the Two Execution Methods

Factor	Sequential Execution	Concurrent Execution
Task Dependencies	Strongly dependent tasks	Independent or loosely coupled
Error Impact	Easier to identify and fix	May affect parallel outcomes
Execution Time	Slower due to linear flow	Faster through parallelization
Complexity	Requires feedback loop	Requires async execution

Response Generation

Response Generation involves dynamically modifying tasks and workflows in response to real-time feedback, errors, or changing objectives. The LLM reasons over these results to ensure the response is accurate, relevant, and aligned with the original goal. **Some of the objectives include:**

1. 
   Adapt to changing conditions
2. 
   Improve via feedback loops
3. 
   Adjust based on partial results
4. 
   Synthesize a final, context-aware response

Replanning with Reflection

Replanning with Reflection lets agents update their task flow based on real-time feedback or results from previously executed sub-tasks. Using LLM reasoning, agents reflect on past steps and their outputs to dynamically adjust remaining actions, enabling flexible, sequential planning.

Some of the objectives include:

1

Ensure adaptability in unpredictable environments.

2

Enable continuous improvement by integrating feedback loops.

3

Mitigate risks by calibrating based on partial results or obstacles.

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Thanks!

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