



# Plan and execute

Plan and execute agents accomplish an objective by first planning what to do, then executing the sub tasks. This idea is largely inspired by [BabyAGI](#) and then the "[Plan-and-Solve](#)" paper.

The planning is almost always done by an LLM.

The execution is usually done by a separate agent (equipped with tools).

## Imports

```
from langchain.chat_models import ChatOpenAI
from langchain_experimental.plan_and_execute import PlanAndExecute,
load_agent_executor, load_chat_planner
from langchain.llms import OpenAI
from langchain import SerpAPIWrapper
from langchain.agents.tools import Tool
from langchain import LLMMathChain
```



## Tools

```
search = SerpAPIWrapper()
llm = OpenAI(temperature=0)
llm_math_chain = LLMMathChain.from_llm(llm=llm, verbose=True)
tools = [
    Tool(
        name = "Search",
        func=search.run,
        description="useful for when you need to answer questions about
current events"
    ),
    Tool(
        name="Calculator",
        func=llm_math_chain.run,
        description="useful for when you need to answer questions about
math"
```

```
    ),  
]
```

## Planner, Executor, and Agent

```
model = ChatOpenAI(temperature=0)
```

```
planner = load_chat_planner(model)
```

```
executor = load_agent_executor(model, tools, verbose=True)
```

```
agent = PlanAndExecute(planner=planner, executor=executor,  
verbose=True)
```

## Run Example

```
agent.run("Who is Leo DiCaprio's girlfriend? What is her current age  
raised to the 0.43 power?")
```

```
> Entering new PlanAndExecute chain...  
steps=[Step(value="Search for Leo DiCaprio's girlfriend on the  
internet."), Step(value='Find her current age.'), Step(value='Raise her  
current age to the 0.43 power using a calculator or programming  
language.'), Step(value='Output the result.'), Step(value="Given the  
above steps taken, respond to the user's original question.\n\n")]  
  
> Entering new AgentExecutor chain...  
Action:  
...  
{  
  "action": "Search",  
  "action_input": "Who is Leo DiCaprio's girlfriend?"  
}  
...
```

Observation: DiCaprio broke up with girlfriend Camila Morrone, 25, in the summer of 2022, after dating for four years. He's since been linked to another famous supermodel – Gigi Hadid. The power couple were first supposedly an item in September after being spotted getting cozy during a party at New York Fashion Week.

Thought:Based on the previous observation, I can provide the answer to the current objective.

Action:

```

{

  "action": "Final Answer",

  "action\_input": "Leo DiCaprio is currently linked to Gigi Hadid."

}

```

> Finished chain.

\*\*\*\*\*

Step: Search for Leo DiCaprio's girlfriend on the internet.

Response: Leo DiCaprio is currently linked to Gigi Hadid.

> Entering new AgentExecutor chain...

Action:

```

{

  "action": "Search",

  "action\_input": "What is Gigi Hadid's current age?"

}

```

Observation: 28 years

Thought:Previous steps: steps=[(Step(value="Search for Leo DiCaprio's girlfriend on the internet."), StepResponse(response='Leo DiCaprio is currently linked to Gigi Hadid.'))]

Current objective: value='Find her current age.'

Action:

```

{

  "action": "Search",

  "action\_input": "What is Gigi Hadid's current age?"

}

```

    ...

```

Observation: 28 years

Thought: Previous steps: steps=[(Step(value="Search for Leo DiCaprio's girlfriend on the internet."), StepResponse(response='Leo DiCaprio is currently linked to Gigi Hadid.')), (Step(value='Find her current age.'), StepResponse(response='28 years'))]

Current objective: None

Action:

```

    ...

```

```

{
  "action": "Final Answer",
  "action_input": "Gigi Hadid's current age is 28 years."
}
...

```

> Finished chain.

```

*****

```

Step: Find her current age.

Response: Gigi Hadid's current age is 28 years.

> Entering new AgentExecutor chain...

Action:

```

    ...

```

```

{
  "action": "Calculator",
  "action_input": "28 ** 0.43"
}
...

```

> Entering new LLMMathChain chain...

28 \*\* 0.43

```

```text

```

28 \*\* 0.43

```

...

```

```

...numexpr.evaluate("28 ** 0.43")...

```

Answer: 4.1906168361987195

> Finished chain.

Observation: Answer: 4.1906168361987195

Thought: The next step is to provide the answer to the user's question.

Action:

```

{

"action": "Final Answer",

"action\_input": "Gigi Hadid's current age raised to the 0.43 power is approximately 4.19."

}

```

> Finished chain.

\*\*\*\*\*

Step: Raise her current age to the 0.43 power using a calculator or programming language.

Response: Gigi Hadid's current age raised to the 0.43 power is approximately 4.19.

> Entering new AgentExecutor chain...

Action:

```

{

"action": "Final Answer",

"action\_input": "The result is approximately 4.19."

}

```

> Finished chain.

\*\*\*\*\*

Step: Output the result.

Response: The result is approximately 4.19.

> Entering new AgentExecutor chain...

Action:

```

{

"action": "Final Answer",

```
"action_input": "Gigi Hadid's current age raised to the 0.43  
power is approximately 4.19."  
}  
...
```

```
> Finished chain.
```

```
*****
```

Step: Given the above steps taken, respond to the user's original question.

Response: Gigi Hadid's current age raised to the 0.43 power is approximately 4.19.

```
> Finished chain.
```

```
"Gigi Hadid's current age raised to the 0.43 power is approximately  
4.19."
```