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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."
```