Agents
Foundations

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June 23, 2024 v2

🎓 The agent's core *conceptually*

Observation

- Text input
- Video / Audio
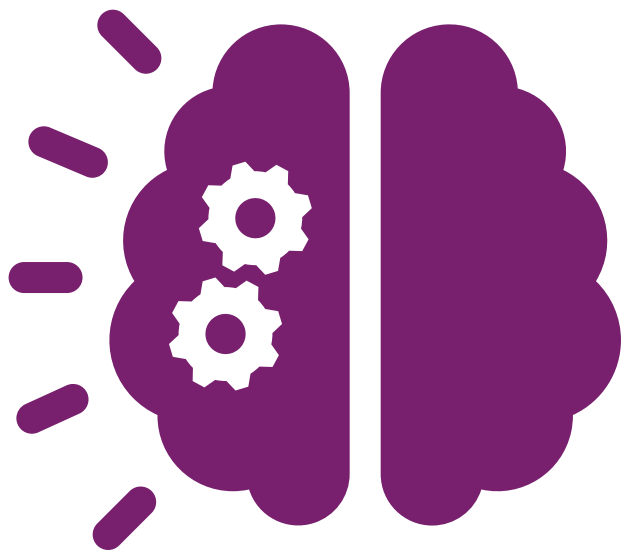- Alarm signal
- etc.

Action

- Text output
- Audio / Video
- Robot move
- Garage door manipulation
- etc.

Body

- Inner loop
- Inner communication
  - Keep things together

Thinking

- Logical thinking
- Problem solving
- Reasoning
- Memory
- etc.
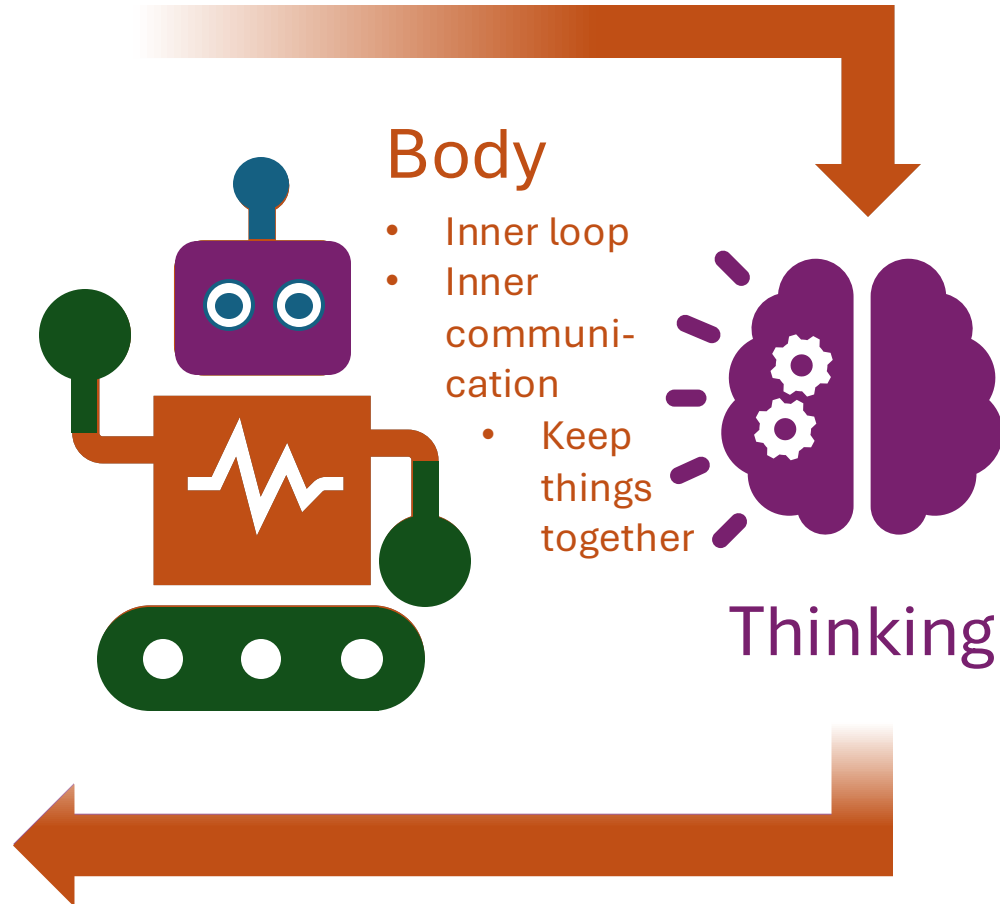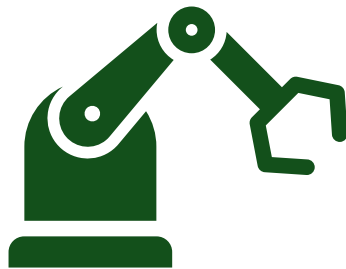
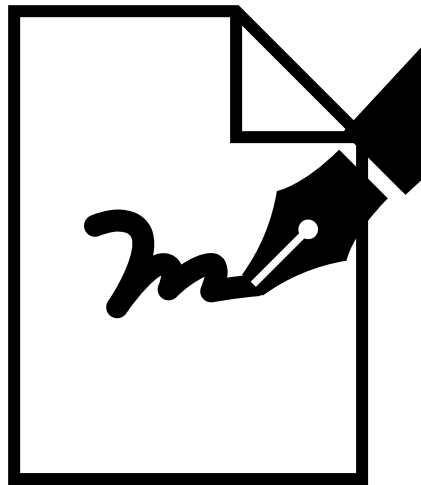# 🔧 The agent's core *technically*

Thinking ⟩⟩⟩ LLM

🔧 The agent's core *technically*
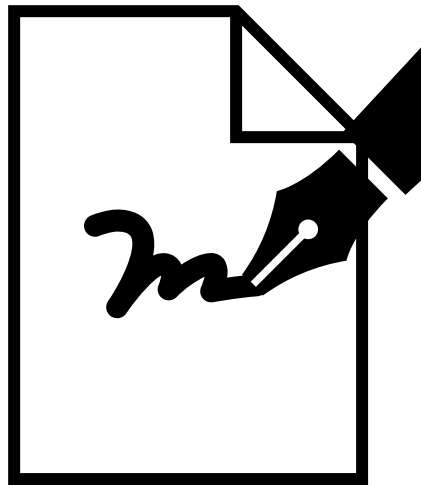
Prompt

LLM
- Logical thinking
- Problem solving
- Reasoning
- ~~Memory~~ *Trained knowledge base*

🔧 The agent's core *technically*

Prompt

LLM
- Logical thinking
- Problem solving
- Reasoning
- Trained knowledge base

🔧 The agent's core *technically*

Prompt

- System prompt
- User prompt

LLM

- Logical thinking
- Problem solving
- Reasoning
- Trained knowledge base

🔧 The agent's core *technically*
ReAct agent

● System prompt   ● User input   ● LLM output

Solve a question answering task with interleaving Thought, Action, Observation steps.
Thought can reason about the current situation, and Action can be three types:
(1) Search[entity], which searches the exact entity on Wikipedia and returns the first paragraph if it exists. If not, it will return some similar entities to search.
(2) Lookup[keyword], which returns the next sentence containing keyword in the current passage.
(3) Finish[answer], which returns the answer and finishes the task.
Here are some examples.

Many examples look like the further conversation

Question:
        Who is the president of the US?
Thought 1: I need to search current president of the US.
Action 1: Search[president of the US]
Observation 1: The president of the US is Joe Biden.
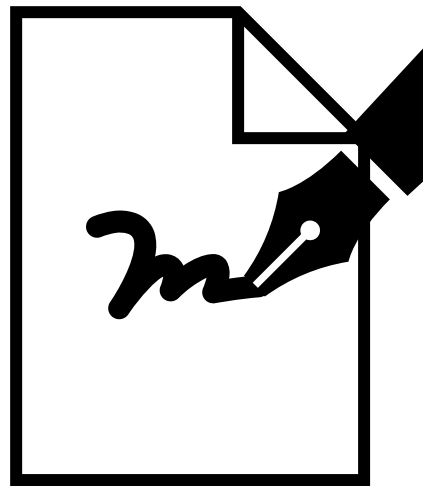Thought 2: The president is Joe Biden.
Action 2: Finish[Joe Biden]
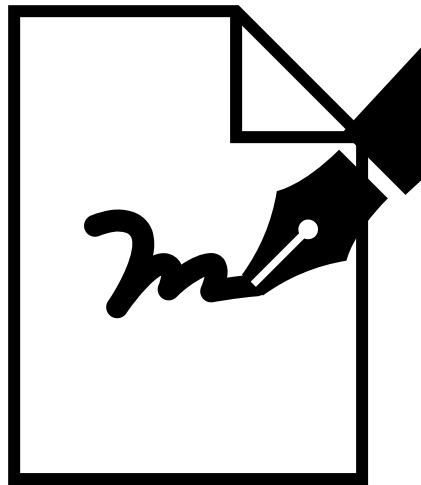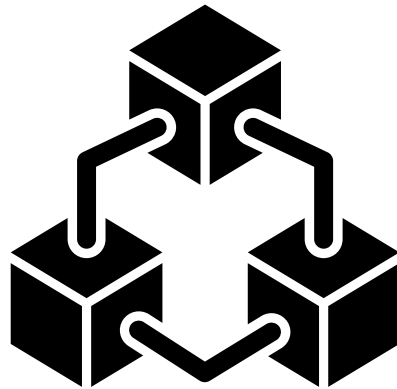
That's it 😀

LLM

🔧 The agent's core *technically*

Prompt ⇄ ? **LLM**

🔧 The agent's core *technically*

Prompt

Procedure

LLM

🔧 The agent's core *technically*

Body

Prompt
- System prompt
- User input
- LLM output
- Action output

Procedure
- Prepare prompt
- Receive LLM outputs
- Call action

LLM
- Logical thinking
- Problem solving
- Reasoning
- Trained knowledge base
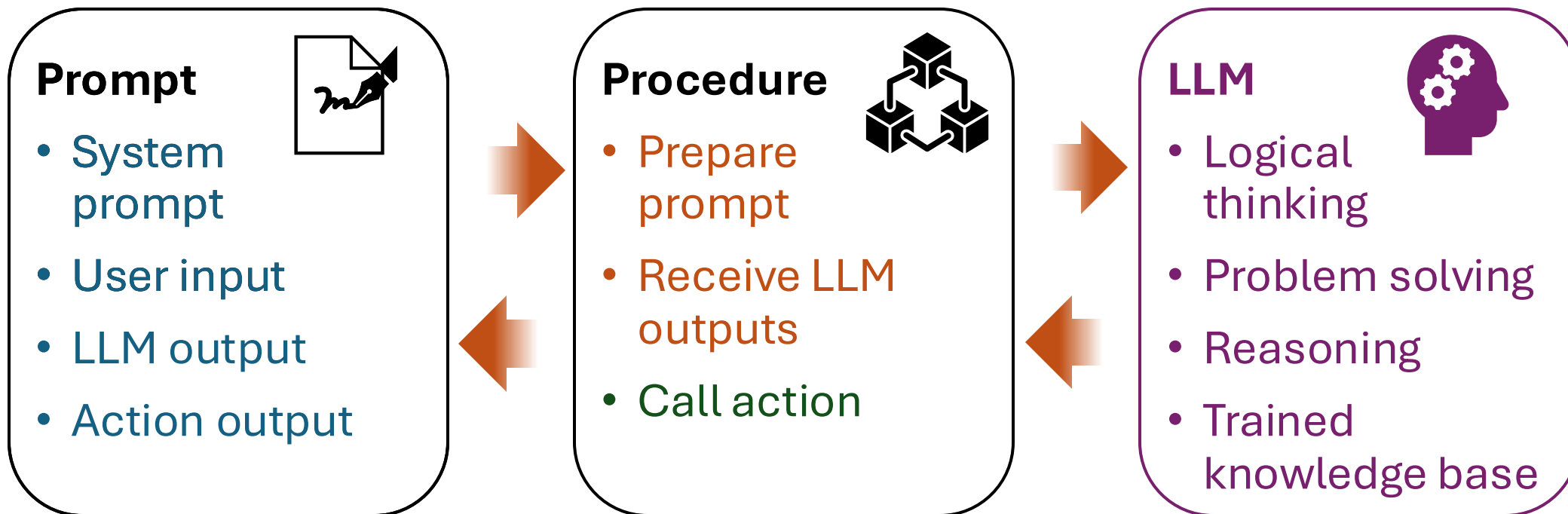
Observation

Action

Thinking

❓ The agent's core *flow*

ReAct agent

Task
  question: "How many times does the UK fit into the USA?"
  state: Uncomplete

Step[1]
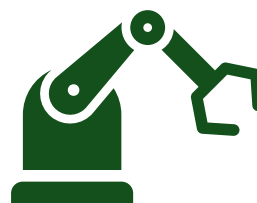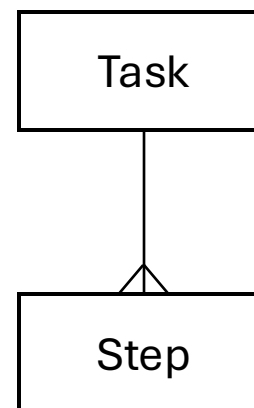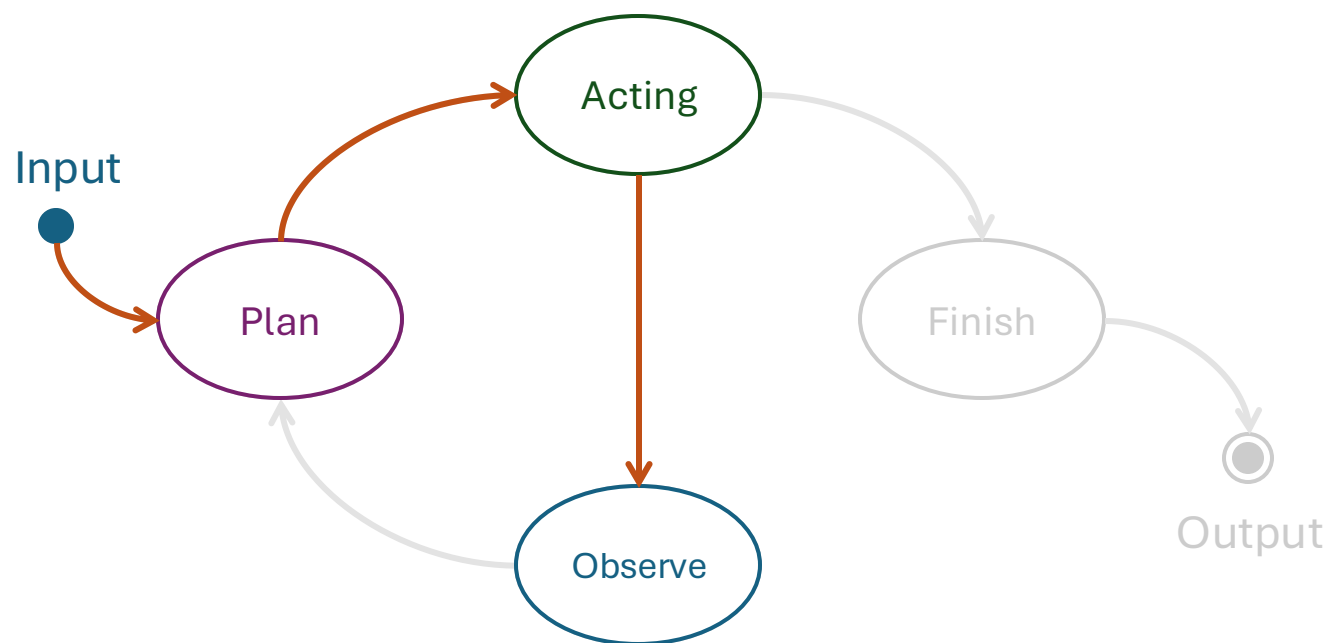 thought: "I need to know the area of the UK."
  action: "Wikipedia[Area of the UK]"
  action_output: "The United Kingdom of Great Britain and Northern Ireland..."
  observation: "UK area is 244,376 km2"

Chat
👩 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *flow*

ReAct agent

Input

Plan → Acting → Observe → Plan

Acting ⟶ Finish ⟶ Output

Task ⟶ Step

```
Task
  question: "How many times does the UK fit
into the USA?"
  state: Uncomplete
```

```
Step[2]
  thought: "I need to know the area of the US."
  action: " Wikipedia[Area of the US]"
  action_output: "The United States of America
(USA or U.S.A.), commonly known as..."
  observation: "US area is approximately
9,833,520 km2"
```
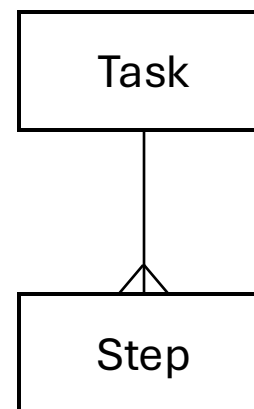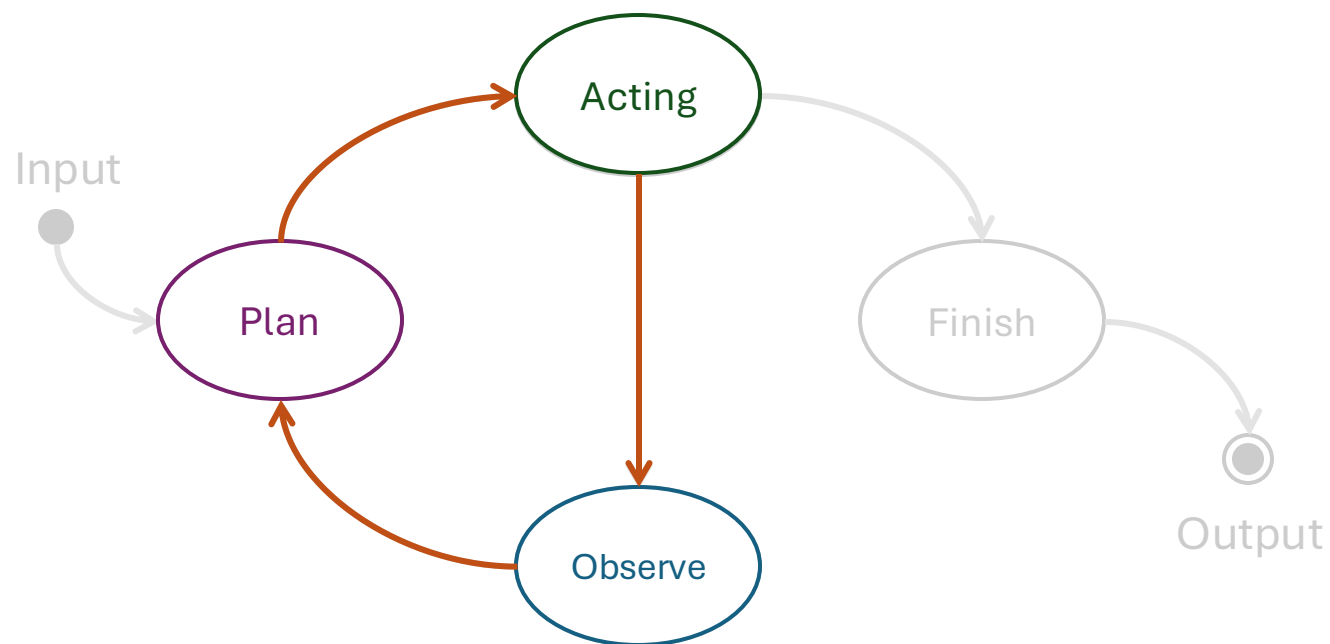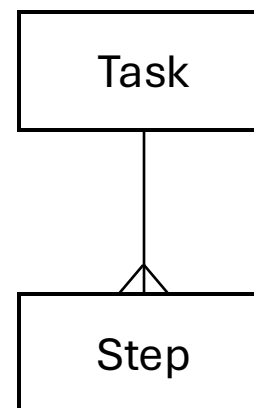
Chat

👩 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *flow*

ReAct agent
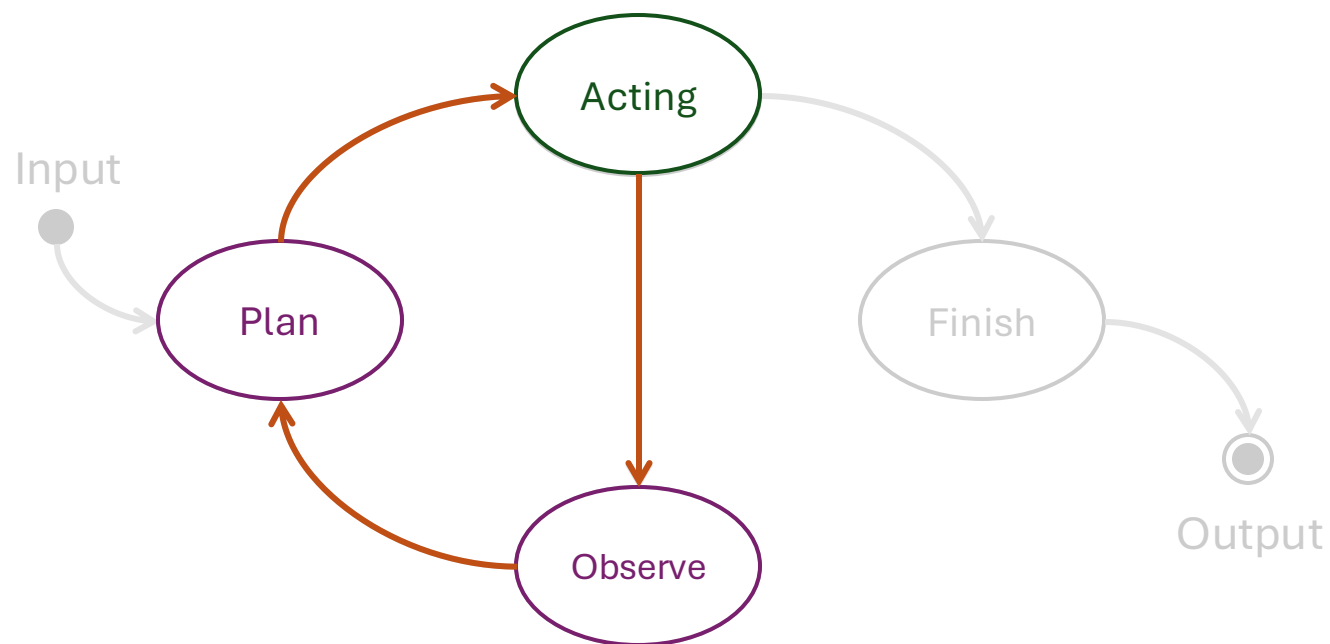
Task
```
Task
  question: "How many times does the UK fit
into the USA?"
  state: Uncomplete
```

Step
```
Step[3]
  thought: "I can calculate how many times the
UK fits into the USA."
  action: "Python[Calculating the ratio of the
areas]"
  action_output: "40.2393033685"
  observation: "The result of the ratio is
40.2393033685."
```

Chat

👨 How many times does the UK fit into the USA?
🤖 Thinking...

⬚? The agent's core *flow*

ReAct agent

Input

Plan

Acting

Finish

Observe

Output

Task

Step

Task
  question: "How many times does the UK fit into the USA?"
  state: Uncomplete
  answer: "Approximately 40.23 times"

Step[4]
  thought: "I have the final answer."
  action: "Final[Approximately 40.23 times]"

Chat

👩 How many times does the UK fit into the USA?
🤖 Thinking...
🤖 Approximately 40.23 times

⬜ The agent's core *abstraction*
ReWOO agent
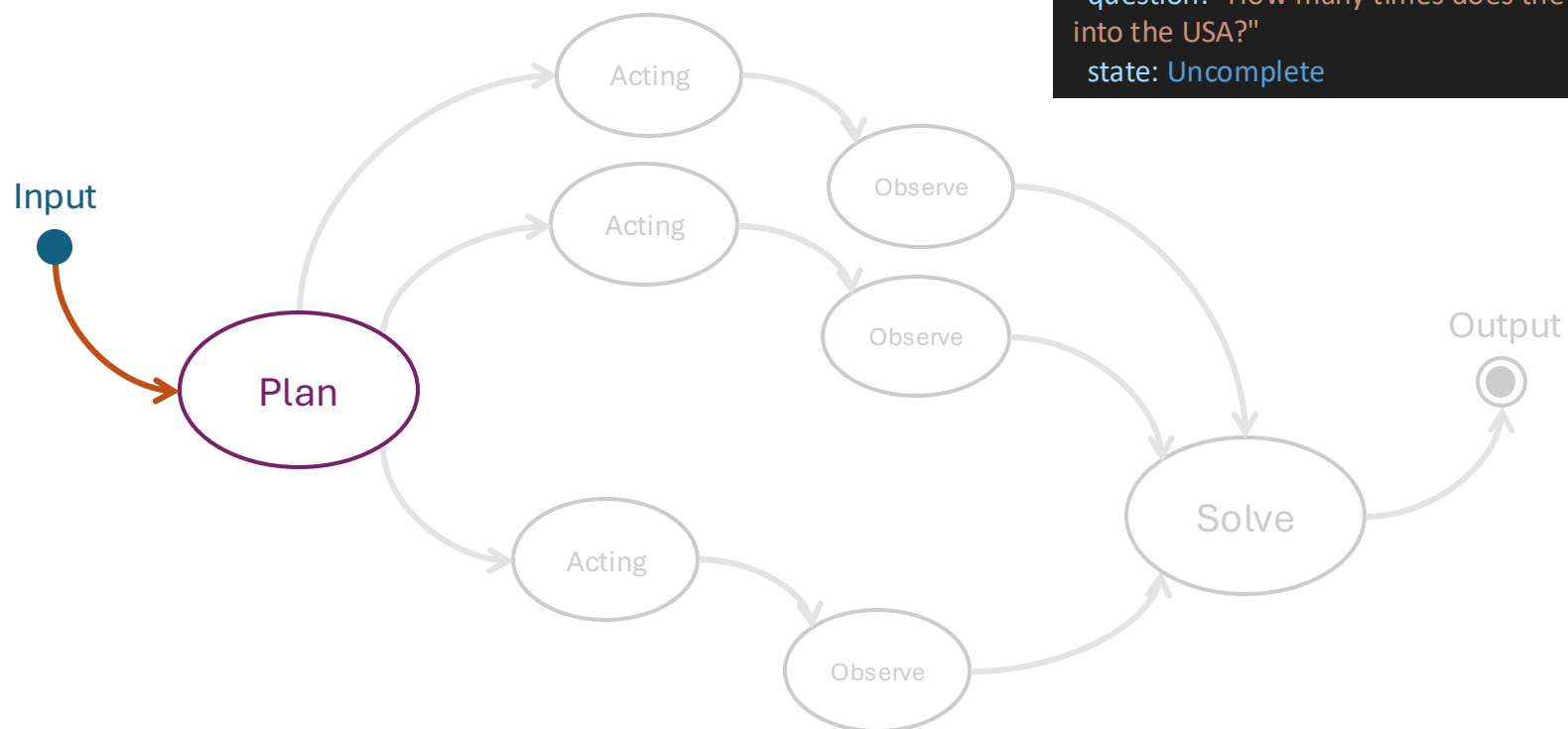
Task
　question: "How many times does the UK fit into the USA?"
　state: Uncomplete

Step[1]

Step[2]

Step[3]

Input

Plan

Acting

Acting

Acting

Observe

Observe

Observe

Solve

Output

Chat

🧑 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *abstraction*

ReWOO agent

Task
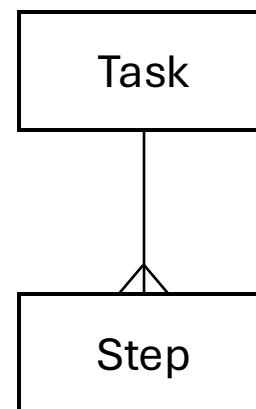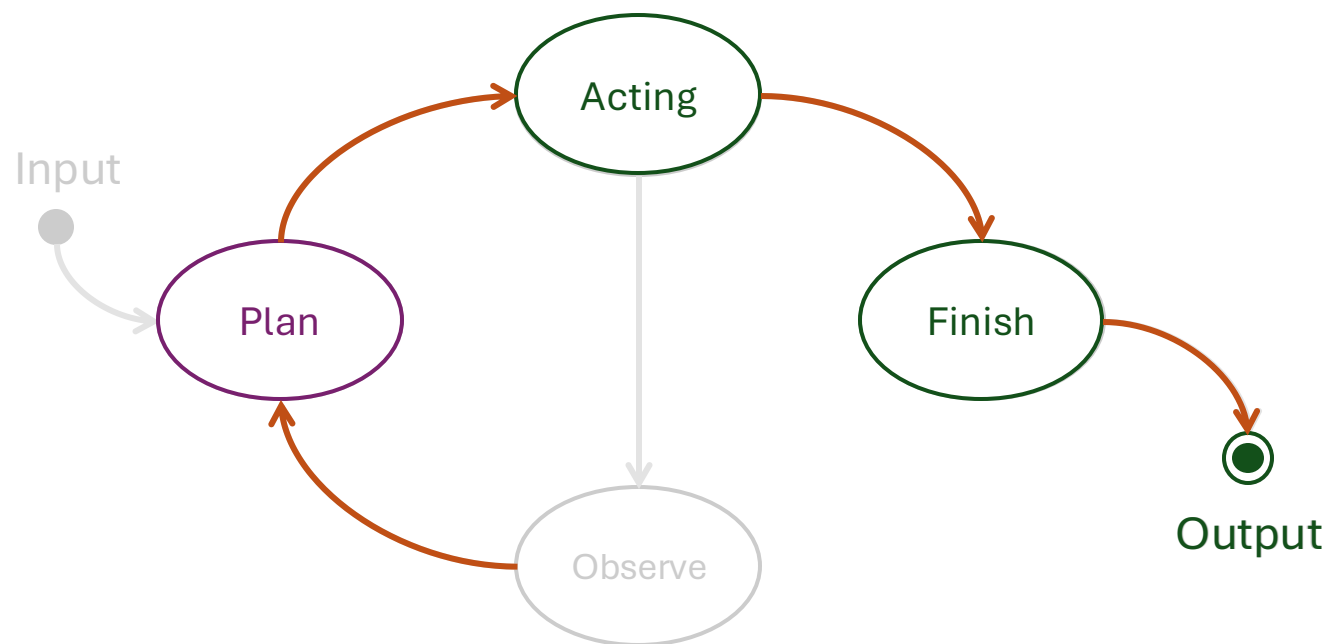 question: "How many times does the UK fit into the USA?"
    state: Uncomplete

Step[1]
  state: Planned
  thought: "I need to know the area of the UK."

Step[2]
  state: Planned
  thought: "I need to know the area of the US."

Step[3] De|
  state: Planned
  thought: "When I have both areas I can calculate how many times the UK fits into the USA."

Chat

🧑 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *abstraction*

ReWOO agent

Task
question: "How many times does the UK fit into the USA?"
state: Uncomplete

Step[1]
state: Planned
thought: "I need to know the area of the UK."
action: "Wikipedia[Area of the UK]"

Step[2]
state: Planned
thought: "I need to know the area of the US."
action: "Wikipedia[Area of the US]"

Step[3] Dependencies[1,2]
state: Planned
thought: "When I have both areas I can calculate how many times the UK fits into the USA."
action: "Python[Calculating the ratio of the areas]"
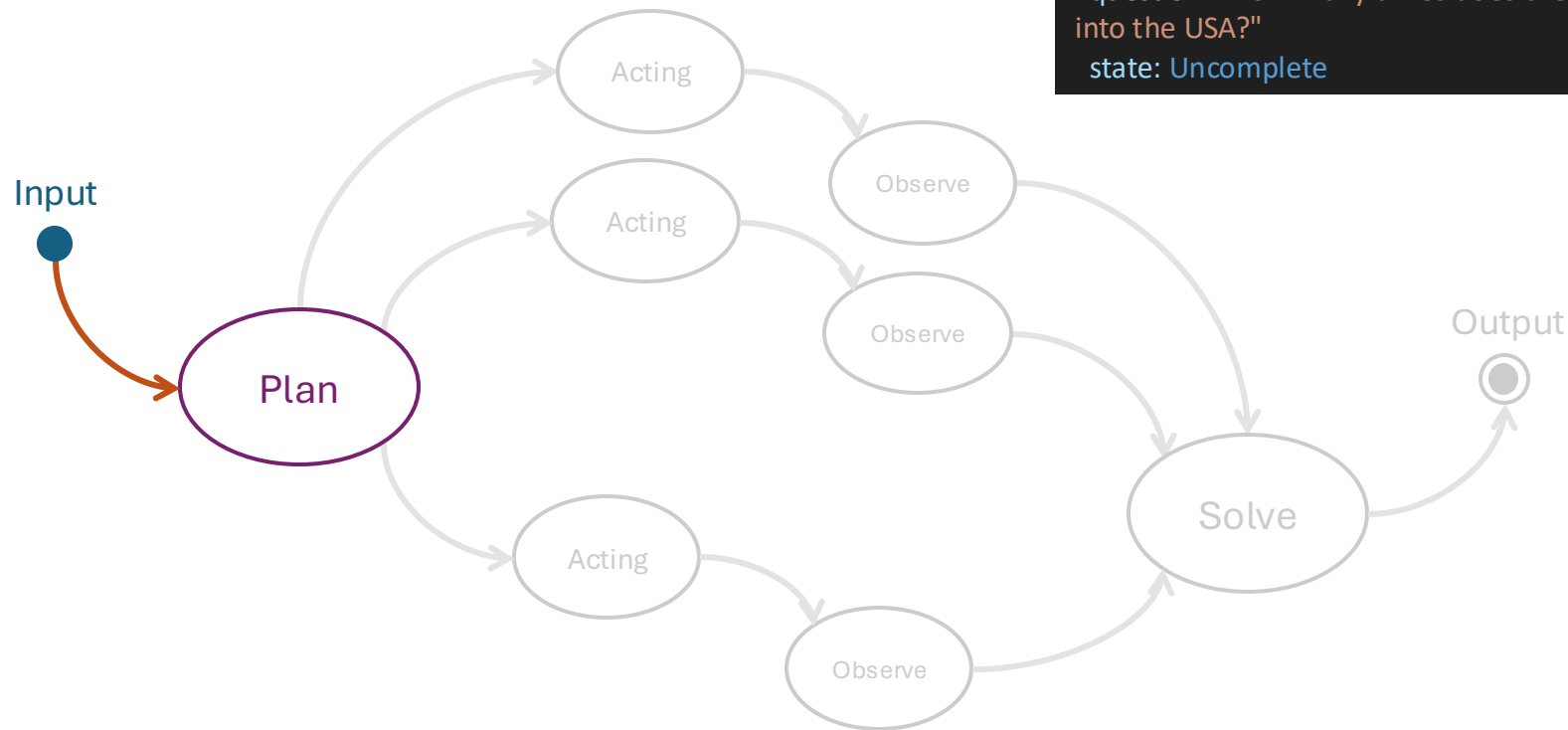
Chat
🧑 How many times does the UK fit into the USA?
🤖 Thinking...

❓The agent's core *abstraction*

ReWOO agent

Task
  question: "How many times does the UK fit into the USA?"
  state: Uncomplete

Step[1]
  state: Running
  thought: "I need to know the area of the UK."
  action: "Wikipedia[Area of the UK]"

Step[2]
  state: Running
  thought: "I need to know the area of the US."
  action: "Wikipedia[Area of the US]"

Step[3] Dependencies[1,2]
  state: Blocked
  thought: "When I have both areas I can calculate how many times the UK fits into the USA."
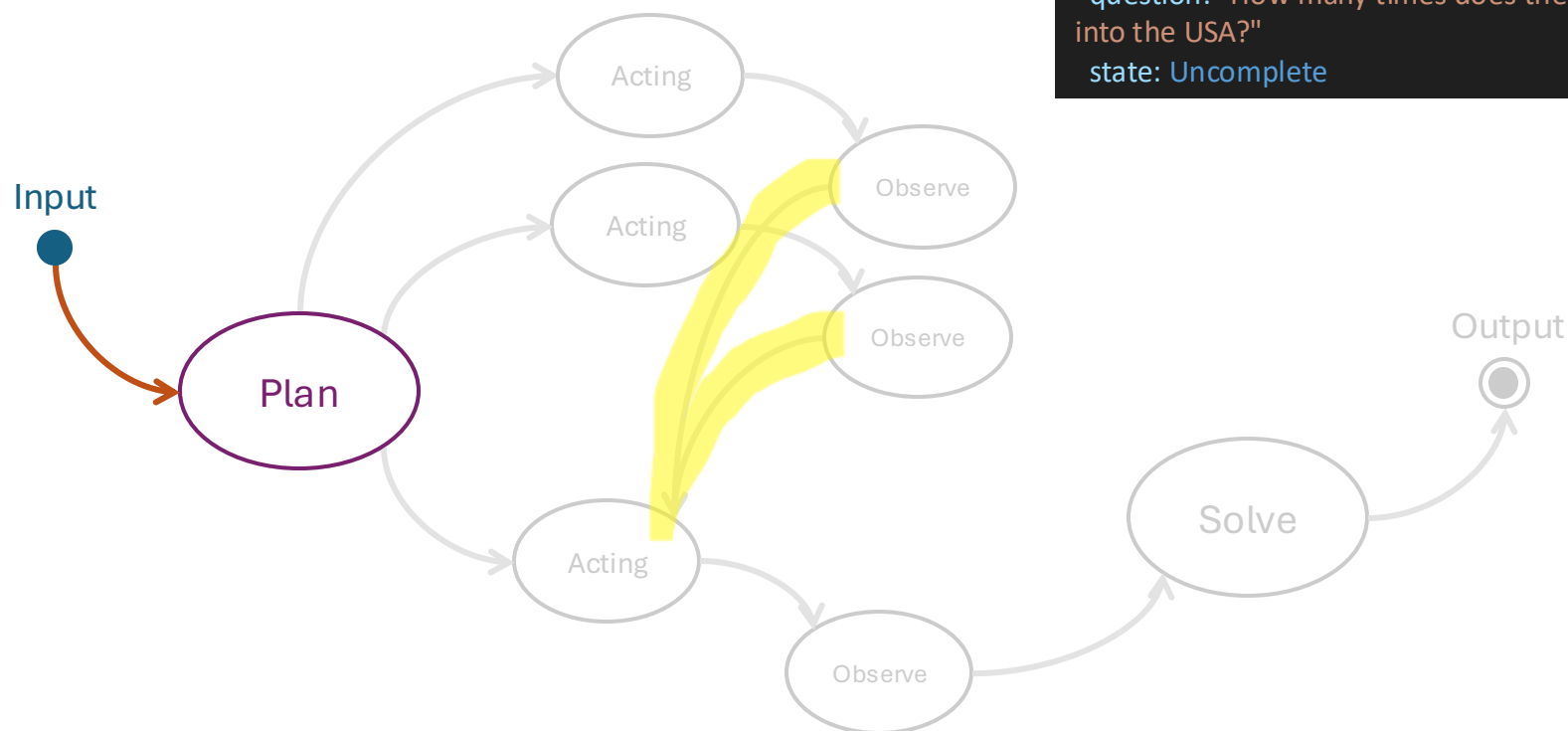 action: "Python[Calculating the ratio of the areas]"

Chat

👤 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *abstraction*

ReWOO agent

Task
  question: "How many times does the UK fit into the USA?"
  state: Uncomplete

Step[1]
  state: Running
  thought: "I need to know the area of the UK."
  action: "Wikipedia[Area of the UK]"
  action_output: "The United Kingdom of Great Britain and Northern Ireland..."

Step[2]
  state: Running
  thought: "I need to know the area of the US."
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Step[3] Dependencies[1,2]
  state: Blocked
  thought: "When I have both areas I can calculate how many times the UK fits into the USA."
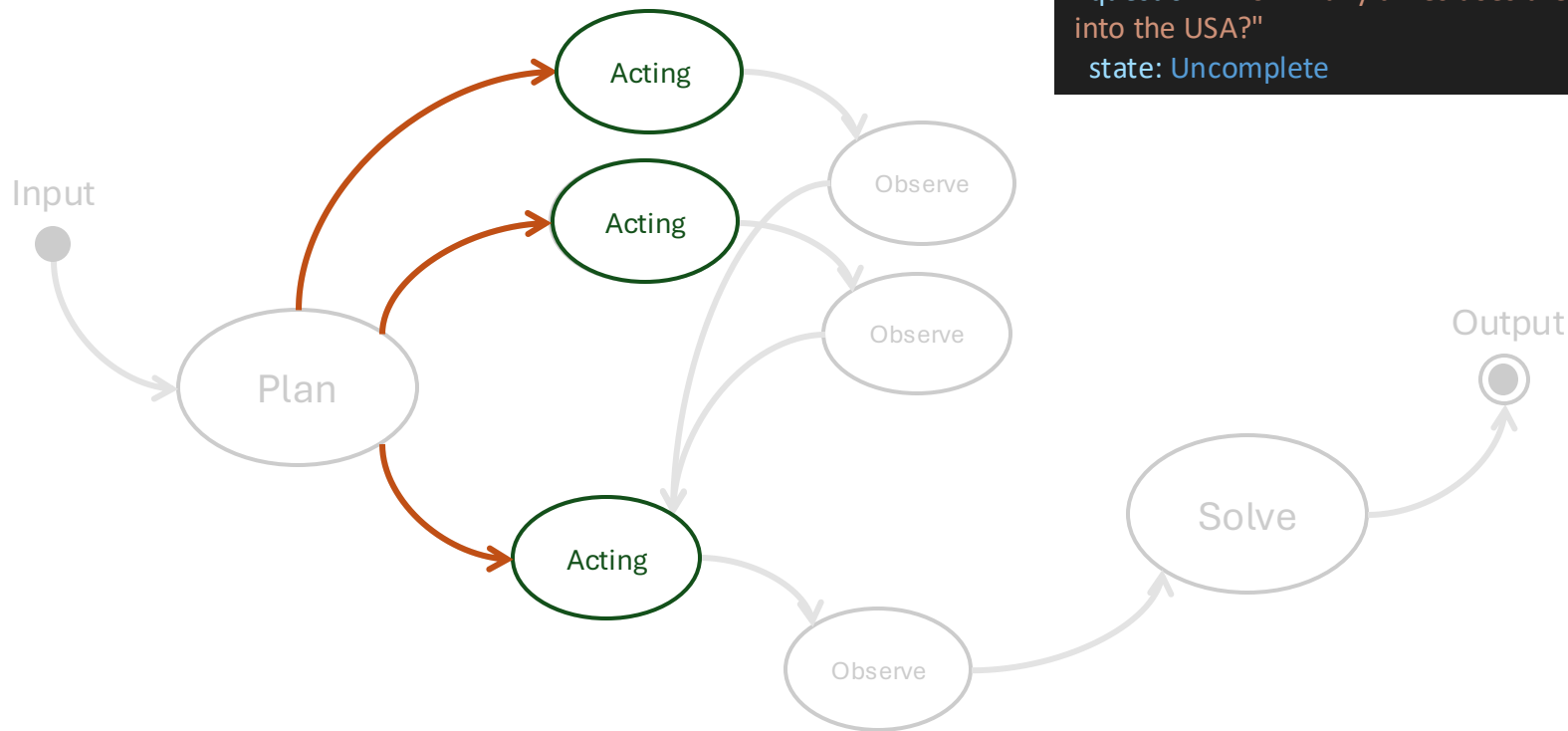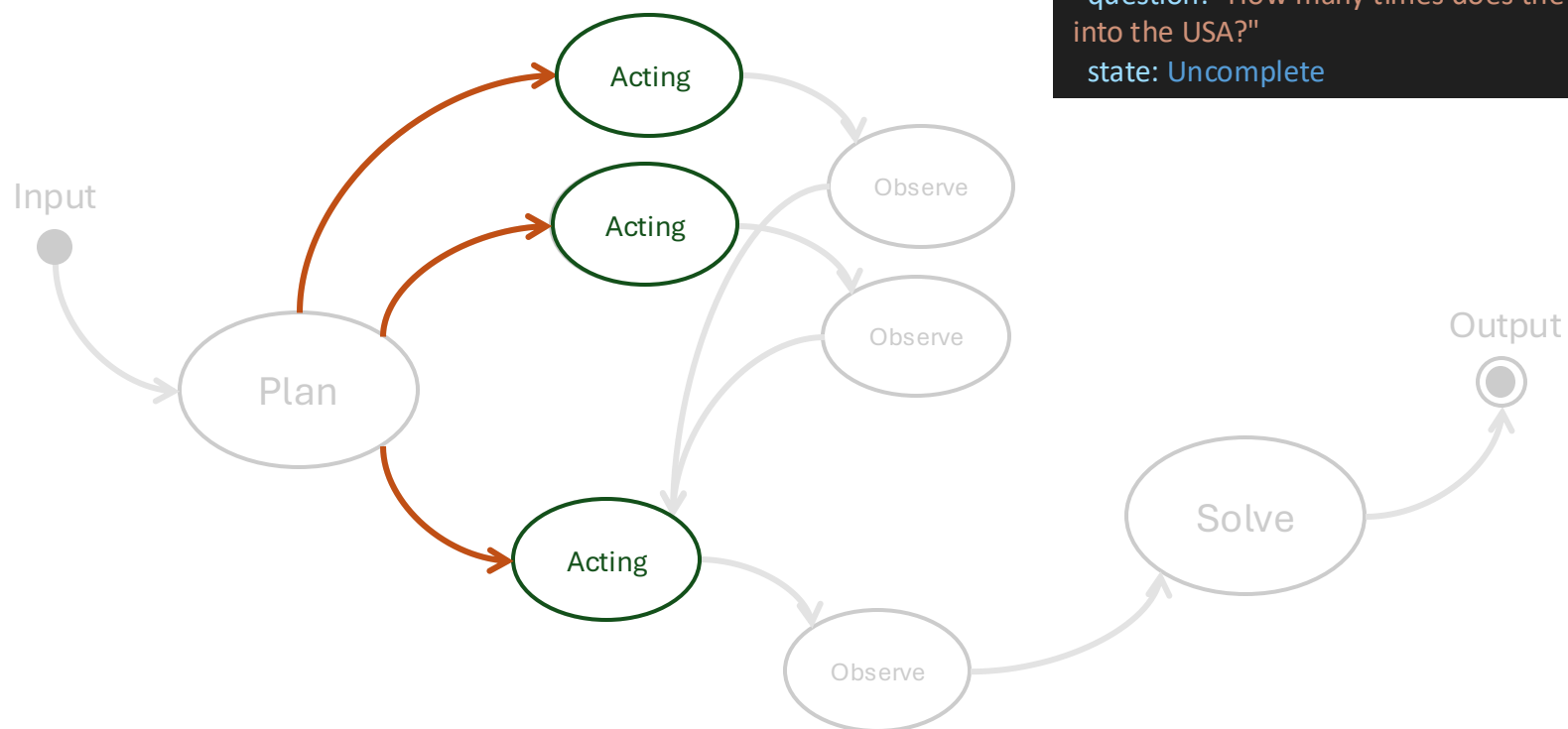 action: "Python[Calculating the ratio of the areas]"

Chat
👩 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *abstraction*

ReWOO agent

Input

Plan

Acting → Observe

Acting → Observe

Acting → Observe → Solve → Output

Task
 question: "How many times does the UK fit into the USA?"
 state: Uncomplete

Chat
👩 How many times does the UK fit into the USA?
🤖 Thinking...

Step[1]
 state: Finished
 thought: "I need to know the area of the UK."
 action: "Wikipedia[Area of the UK]"
 action_output: "The United Kingdom of Great Britain and Northern Ireland..."
 observation: "UK area is 244,376 km2"

Step[2]
 state: Finished
 thought: "I need to know the area of the US."
 action: "Wikipedia[Area of the US]"
 action_output: "The United States of America (USA or U.S.A.), commonly known as..."
 observation: "US area is approximately 9,833,520 km2"
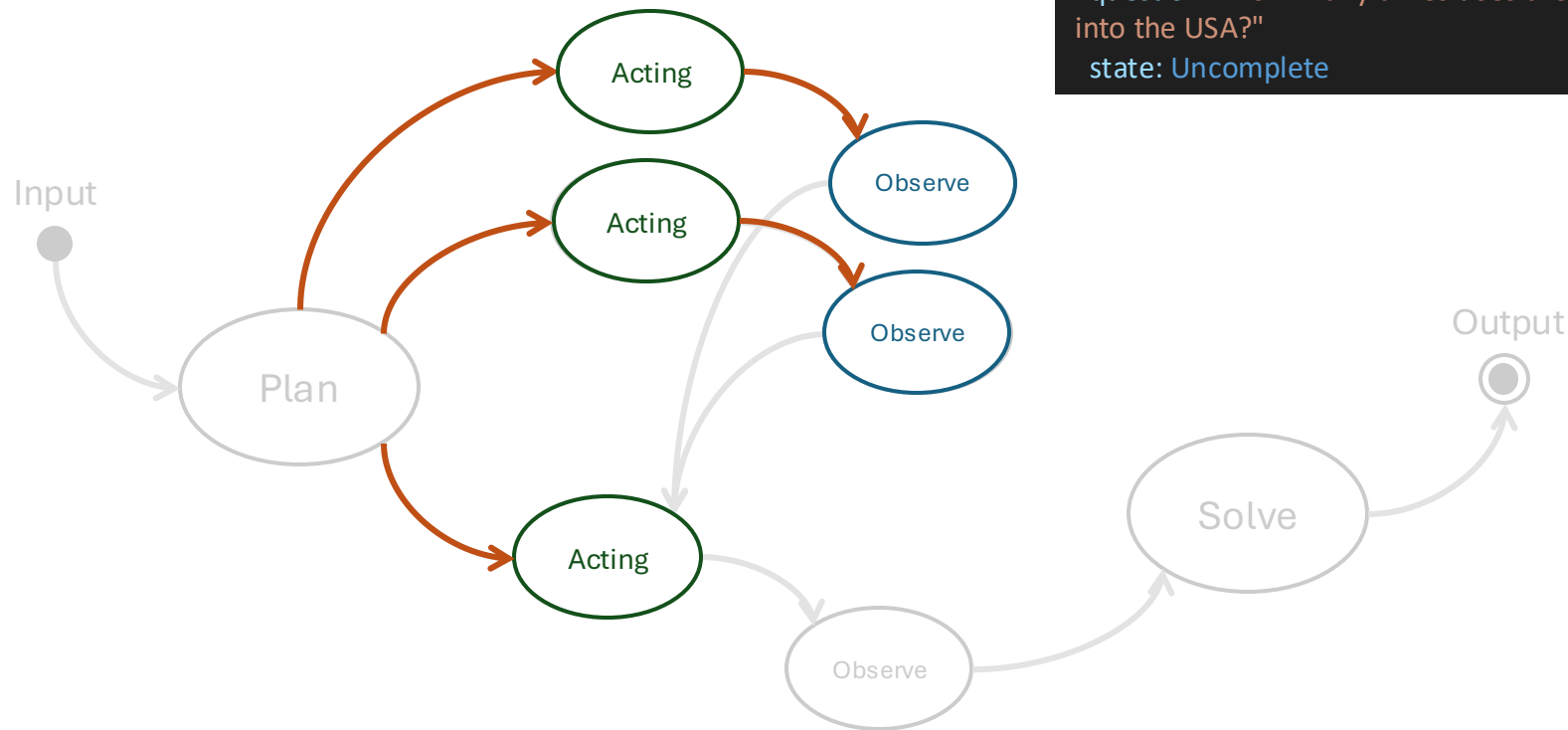
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⍰ The agent's core *abstraction*
ReWOO agent

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question: "How many times does the UK fit into the USA?"
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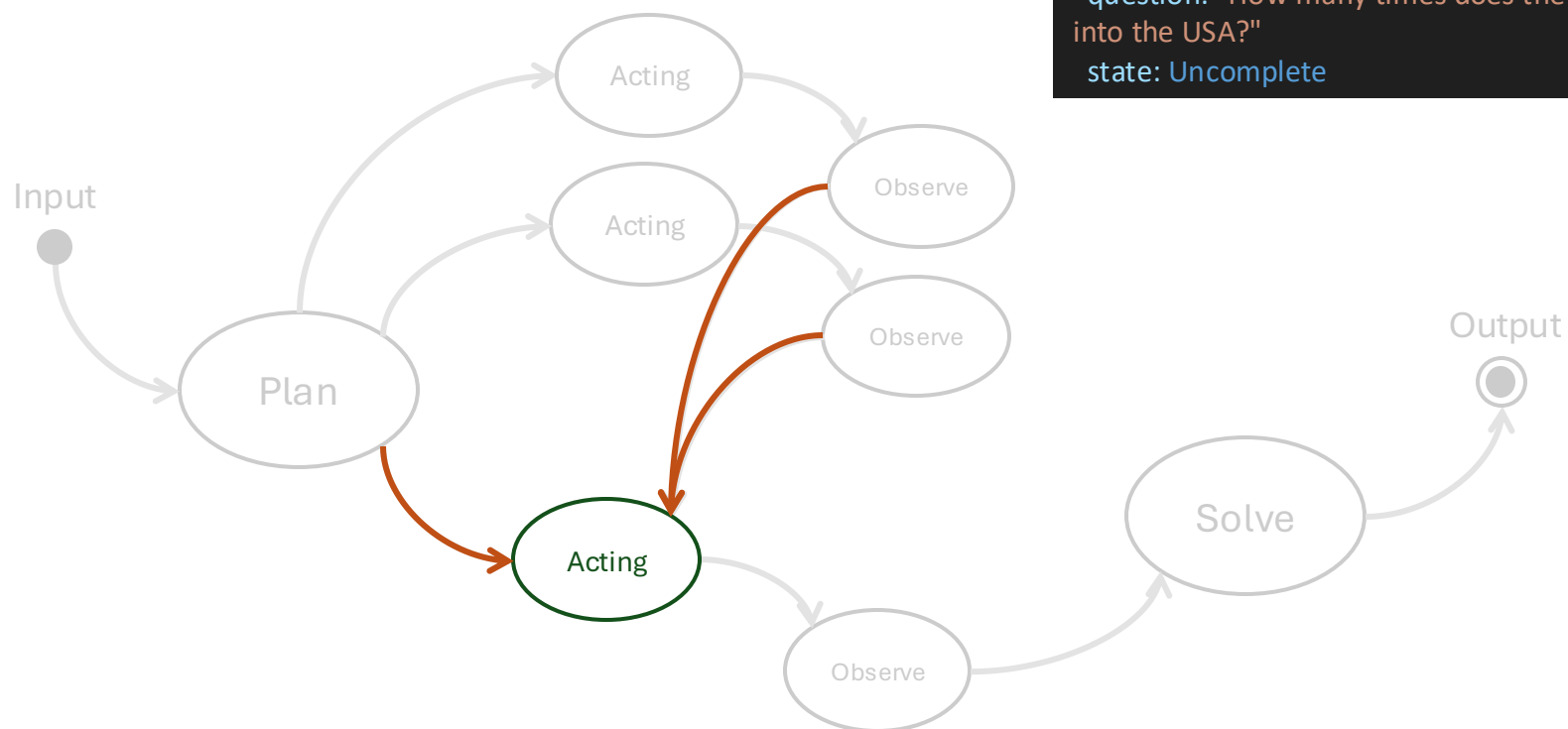action: "Python[Calculating the ratio of the areas]"
action_output: "40.2393033685"

Chat
🧑 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *abstraction*

ReWOO agent

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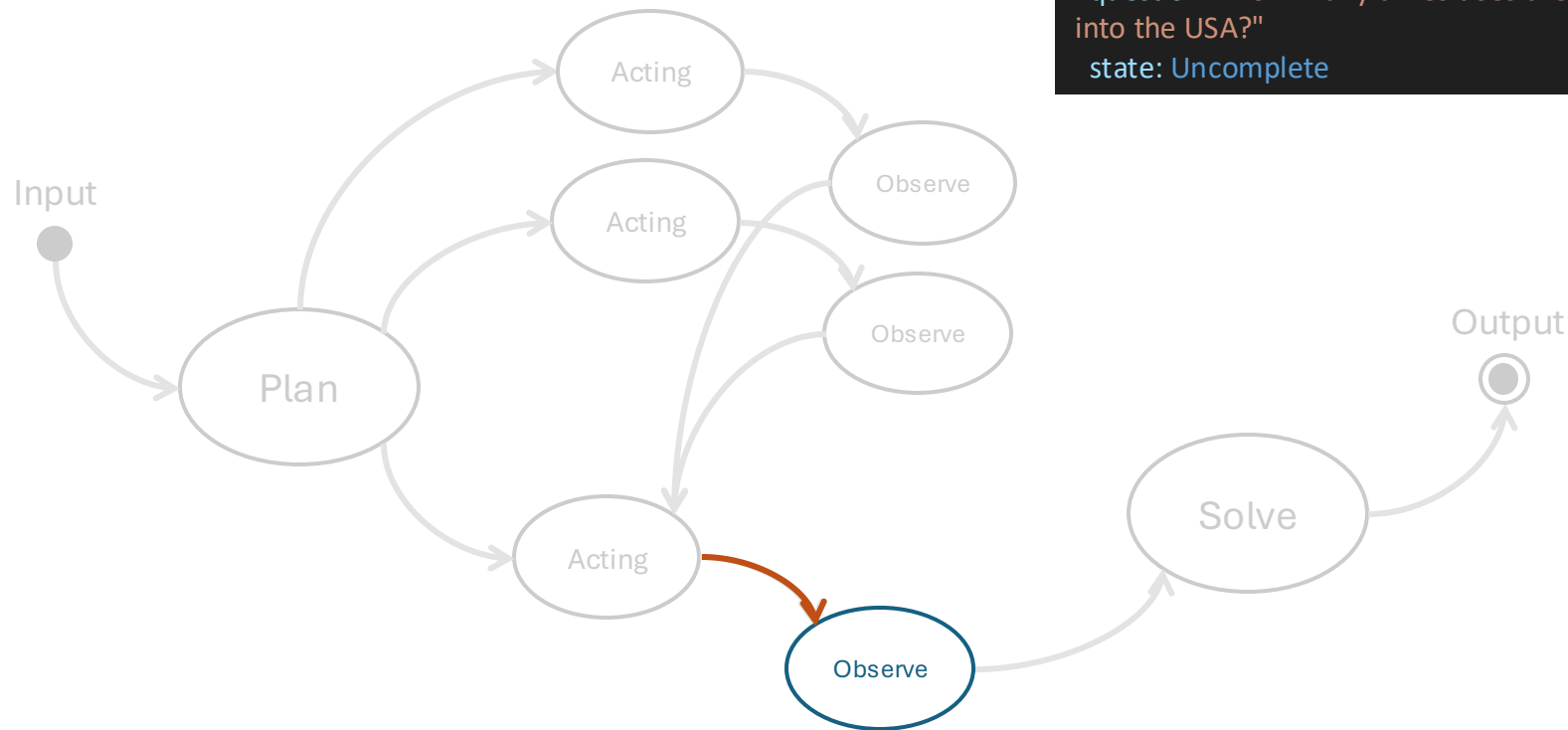 action_output: "40.2393033685"
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Chat
👤 How many times does the UK fit into the USA?
🤖 Thinking...

❓ The agent's core *abstraction*

ReWOO agent

Input → **Plan** → **Acting** → **Observe** ... **Solve** → **Output**

```
Task
  question: "How many times does the UK fit
  into the USA?"
  state: Completed
  answer: "Approximately 40.23 times"
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Step[1]
  state: Finished
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  thought: "I need to know the area of the US."
  action: "Wikipedia[Area of the US]"
  action_output: "The United States of America (USA or
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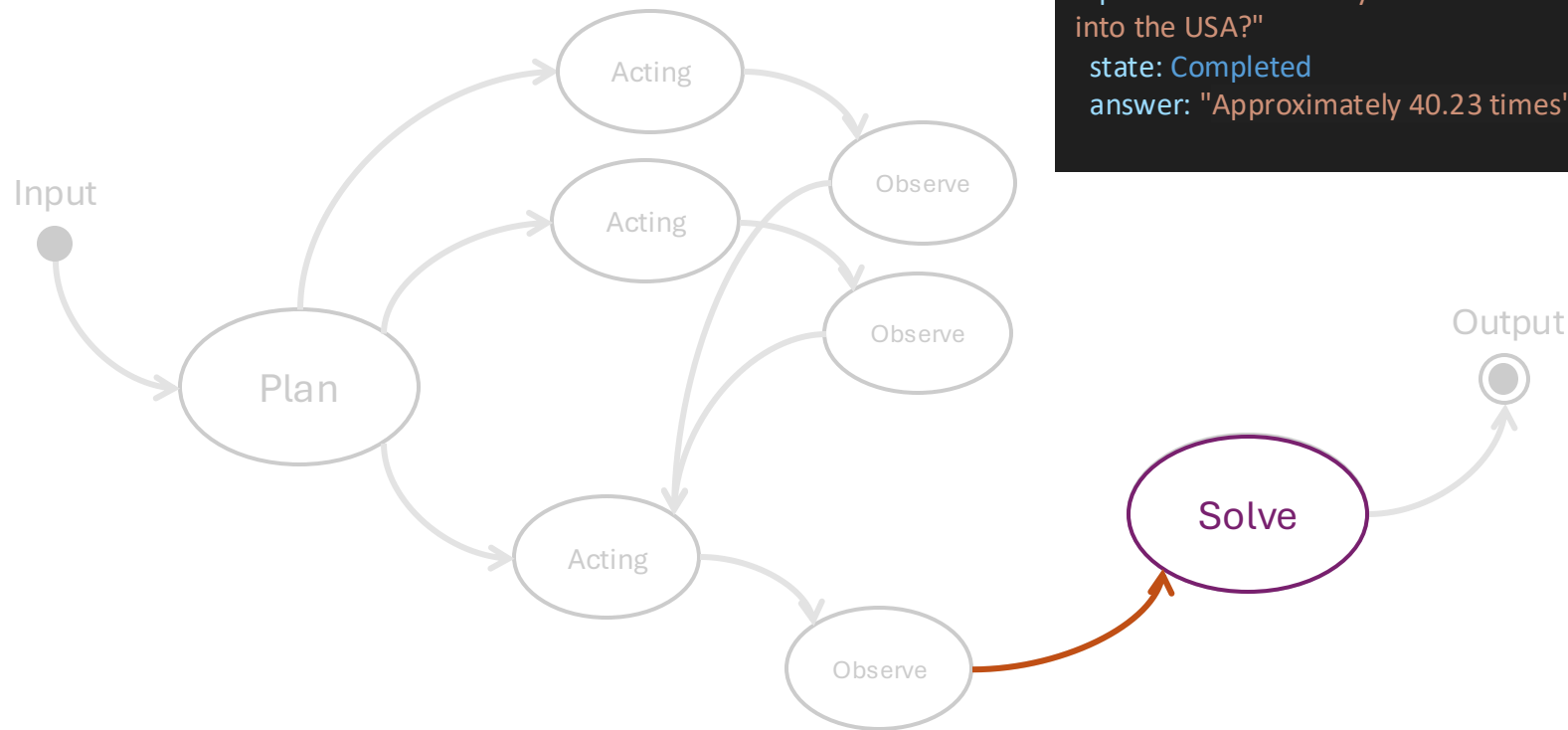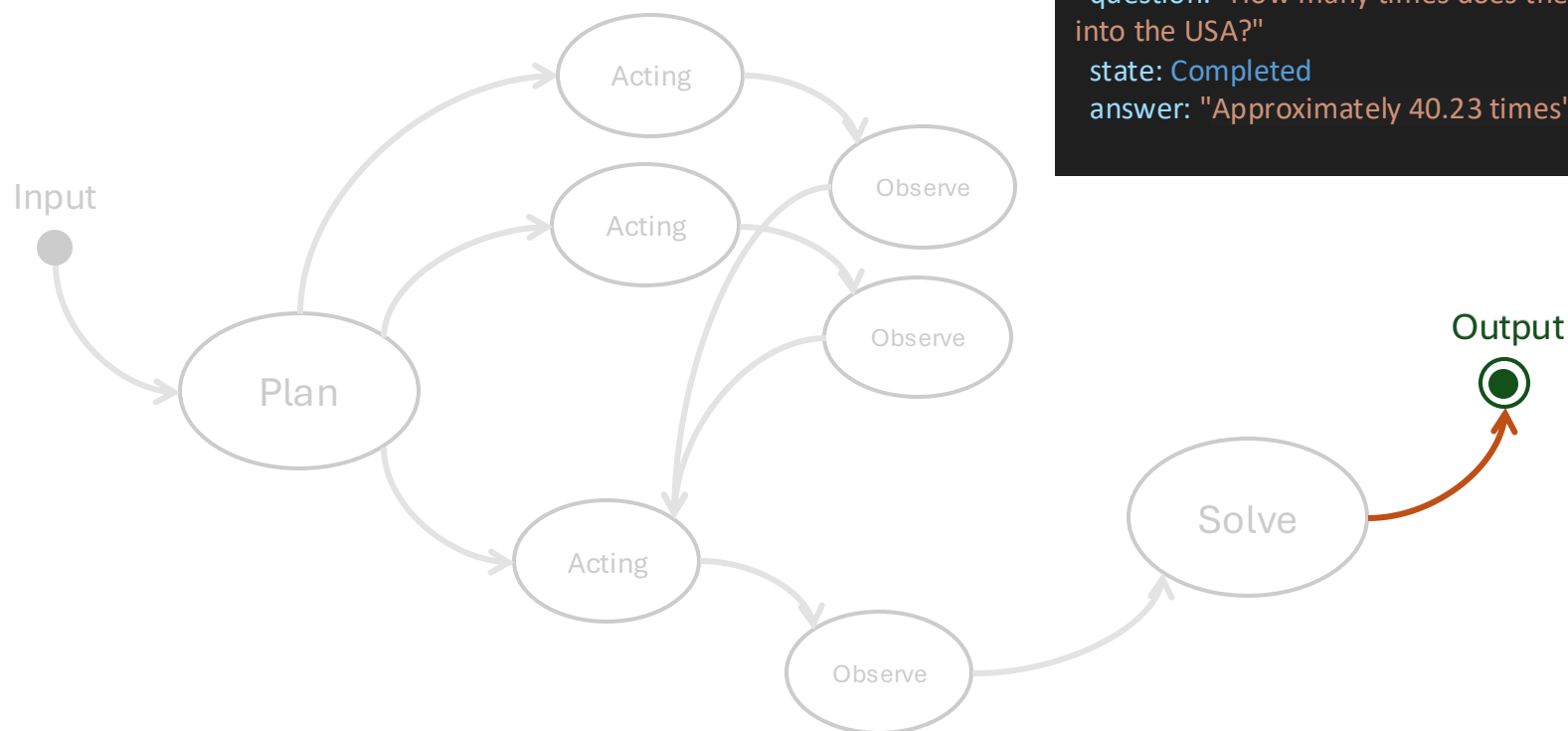
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Chat
👩 How many times does the UK fit into the USA?
🤖 Thinking...
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🤖 The agent's core *abstraction*

ReWOO agent

Task
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Chat
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👤 How many times does the UK fit into the USA?
🤖 Thinking...
🤖 Approximately 40.23 times
```

The End