

langgraphwithexternaltools

August 29, 2024

```
[1]: !pip install langgraph langsmith langchain langchain_groq langchain_community
```

```
Collecting langgraph
  Downloading langgraph-0.2.14-py3-none-any.whl.metadata (13 kB)
Collecting langsmith
  Downloading langsmith-0.1.106-py3-none-any.whl.metadata (13 kB)
Collecting langchain
  Downloading langchain-0.2.15-py3-none-any.whl.metadata (7.1 kB)
Collecting langchain_groq
  Downloading langchain_groq-0.1.9-py3-none-any.whl.metadata (2.9 kB)
Collecting langchain_community
  Downloading langchain_community-0.2.14-py3-none-any.whl.metadata (2.7 kB)
Collecting langchain-core<0.3,>=0.2.27 (from langgraph)
  Downloading langchain_core-0.2.36-py3-none-any.whl.metadata (6.2 kB)
Collecting langgraph-checkpoint<2.0.0,>=1.0.2 (from langgraph)
  Downloading langgraph_checkpoint-1.0.6-py3-none-any.whl.metadata (4.5 kB)
Collecting httpx<1,>=0.23.0 (from langsmith)
  Downloading httpx-0.27.2-py3-none-any.whl.metadata (7.1 kB)
Collecting orjson<4.0.0,>=3.9.14 (from langsmith)
  Downloading orjson-3.10.7-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (50 kB)
50.4/50.4 kB
811.1 kB/s eta 0:00:00
Requirement already satisfied: pydantic<3,>=1 in
/usr/local/lib/python3.10/dist-packages (from langsmith) (2.8.2)
Requirement already satisfied: requests<3,>=2 in /usr/local/lib/python3.10/dist-
packages (from langsmith) (2.32.3)
Requirement already satisfied: PyYAML>=5.3 in /usr/local/lib/python3.10/dist-
packages (from langchain) (6.0.2)
Requirement already satisfied: SQLAlchemy<3,>=1.4 in
/usr/local/lib/python3.10/dist-packages (from langchain) (2.0.32)
Requirement already satisfied: aiohttp<4.0.0,>=3.8.3 in
/usr/local/lib/python3.10/dist-packages (from langchain) (3.10.5)
Requirement already satisfied: async-timeout<5.0.0,>=4.0.0 in
/usr/local/lib/python3.10/dist-packages (from langchain) (4.0.3)
Collecting langchain-text-splitters<0.3.0,>=0.2.0 (from langchain)
  Downloading langchain_text_splitters-0.2.2-py3-none-any.whl.metadata (2.1 kB)
Requirement already satisfied: numpy<2,>=1 in /usr/local/lib/python3.10/dist-
```

```

packages (from langchain) (1.26.4)
Collecting tenacity!=8.4.0,<9.0.0,>=8.1.0 (from langchain)
  Downloading tenacity-8.5.0-py3-none-any.whl.metadata (1.2 kB)
Collecting groq<1,>=0.4.1 (from langchain_groq)
  Downloading groq-0.10.0-py3-none-any.whl.metadata (13 kB)
Collecting dataclasses-json<0.7,>=0.5.7 (from langchain_community)
  Downloading dataclasses_json-0.6.7-py3-none-any.whl.metadata (25 kB)
Collecting jsonpatch<2.0,>=1.33 (from langchain-core<0.3,>=0.2.27->langgraph)
  Downloading jsonpatch-1.33-py2.py3-none-any.whl.metadata (3.0 kB)
Requirement already satisfied: packaging<25,>=23.2 in
/usr/local/lib/python3.10/dist-packages (from langchain-
core<0.3,>=0.2.27->langgraph) (24.1)
Requirement already satisfied: typing-extensions>=4.7 in
/usr/local/lib/python3.10/dist-packages (from langchain-
core<0.3,>=0.2.27->langgraph) (4.12.2)
Requirement already satisfied: aiohappyeyeballs>=2.3.0 in
/usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain)
(2.4.0)
Requirement already satisfied: aiosignal>=1.1.2 in
/usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain)
(1.3.1)
Requirement already satisfied: attrs>=17.3.0 in /usr/local/lib/python3.10/dist-
packages (from aiohttp<4.0.0,>=3.8.3->langchain) (24.2.0)
Requirement already satisfied: frozenlist>=1.1.1 in
/usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain)
(1.4.1)
Requirement already satisfied: multidict<7.0,>=4.5 in
/usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain)
(6.0.5)
Requirement already satisfied: yarl<2.0,>=1.0 in /usr/local/lib/python3.10/dist-
packages (from aiohttp<4.0.0,>=3.8.3->langchain) (1.9.4)
Collecting marshmallow<4.0.0,>=3.18.0 (from dataclasses-
json<0.7,>=0.5.7->langchain_community)
  Downloading marshmallow-3.22.0-py3-none-any.whl.metadata (7.2 kB)
Collecting typing-inspect<1,>=0.4.0 (from dataclasses-
json<0.7,>=0.5.7->langchain_community)
  Downloading typing_inspect-0.9.0-py3-none-any.whl.metadata (1.5 kB)
Requirement already satisfied: anyio<5,>=3.5.0 in
/usr/local/lib/python3.10/dist-packages (from groq<1,>=0.4.1->langchain_groq)
(3.7.1)
Requirement already satisfied: distro<2,>=1.7.0 in /usr/lib/python3/dist-
packages (from groq<1,>=0.4.1->langchain_groq) (1.7.0)
Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-
packages (from groq<1,>=0.4.1->langchain_groq) (1.3.1)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-
packages (from httpx<1,>=0.23.0->langsmith) (2024.7.4)
Collecting httpcore==1.* (from httpx<1,>=0.23.0->langsmith)
  Downloading httpcore-1.0.5-py3-none-any.whl.metadata (20 kB)

```

Requirement already satisfied: idna in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith) (3.8)

Collecting h11<0.15,>=0.13 (from httpcore==1.*->httpx<1,>=0.23.0->langsmith)

Downloading h11-0.14.0-py3-none-any.whl.metadata (8.2 kB)

Requirement already satisfied: annotated-types>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langsmith) (0.7.0)

Requirement already satisfied: pydantic-core==2.20.1 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langsmith) (2.20.1)

Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langsmith) (3.3.2)

Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langsmith) (2.0.7)

Requirement already satisfied: greenlet!=0.4.17 in /usr/local/lib/python3.10/dist-packages (from SQLAlchemy<3,>=1.4->langchain) (3.0.3)

Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio<5,>=3.5.0->groq<1,>=0.4.1->langchain_groq) (1.2.2)

Collecting jsonpointer>=1.9 (from jsonpatch<2.0,>=1.33->langchain-core<0.3,>=0.2.27->langgraph)

Downloading jsonpointer-3.0.0-py2.py3-none-any.whl.metadata (2.3 kB)

Collecting mypy_extensions>=0.3.0 (from typing-inspect<1,>=0.4.0->dataclasses-json<0.7,>=0.5.7->langchain_community)

Downloading mypy_extensions-1.0.0-py3-none-any.whl.metadata (1.1 kB)

Downloading langgraph-0.2.14-py3-none-any.whl (87 kB)

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Downloading langsmith-0.1.106-py3-none-any.whl (150 kB)

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Downloading langchain-0.2.15-py3-none-any.whl (1.0 MB)

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Downloading langchain_groq-0.1.9-py3-none-any.whl (14 kB)

Downloading langchain_community-0.2.14-py3-none-any.whl (2.3 MB)

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Downloading langchain_core-0.2.36-py3-none-any.whl (395 kB)

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Downloading dataclasses_json-0.6.7-py3-none-any.whl (28 kB)

Downloading groq-0.10.0-py3-none-any.whl (106 kB)

106.3/106.3 kB

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Downloading httpx-0.27.2-py3-none-any.whl (76 kB)

76.4/76.4 kB

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Downloading httpcore-1.0.5-py3-none-any.whl (77 kB)

77.9/77.9 kB

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Downloading langchain_text_splitters-0.2.2-py3-none-any.whl (25 kB)

Downloading langgraph_checkpoint-1.0.6-py3-none-any.whl (15 kB)

Downloading

orjson-3.10.7-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (141 kB)

141.9/141.9 kB

8.2 MB/s eta 0:00:00

Downloading tenacity-8.5.0-py3-none-any.whl (28 kB)

Downloading jsonpatch-1.33-py2.py3-none-any.whl (12 kB)

Downloading marshmallow-3.22.0-py3-none-any.whl (49 kB)

49.3/49.3 kB

140.5 kB/s eta 0:00:00

Downloading typing_inspect-0.9.0-py3-none-any.whl (8.8 kB)

Downloading h11-0.14.0-py3-none-any.whl (58 kB)

58.3/58.3 kB

4.1 MB/s eta 0:00:00

Downloading jsonpointer-3.0.0-py2.py3-none-any.whl (7.6 kB)

Downloading mpy_extensions-1.0.0-py3-none-any.whl (4.7 kB)

Installing collected packages: tenacity, orjson, mpy_extensions, marshmallow, jsonpointer, h11, typing-inspect, jsonpatch, httpcore, httpx, dataclasses-json, langsmith, groq, langchain-core, langgraph-checkpoint, langchain-text-splitters, langchain_groq, langgraph, langchain, langchain_community

Attempting uninstall: tenacity

Found existing installation: tenacity 9.0.0

Uninstalling tenacity-9.0.0:

Successfully uninstalled tenacity-9.0.0

Successfully installed dataclasses-json-0.6.7 groq-0.10.0 h11-0.14.0

httpcore-1.0.5 httpx-0.27.2 jsonpatch-1.33 jsonpointer-3.0.0 langchain-0.2.15

langchain-core-0.2.36 langchain-text-splitters-0.2.2 langchain_community-0.2.14

langchain_groq-0.1.9 langgraph-0.2.14 langgraph-checkpoint-1.0.6

langsmith-0.1.106 marshmallow-3.22.0 mpy_extensions-1.0.0 orjson-3.10.7

tenacity-8.5.0 typing-inspect-0.9.0

```
[2]: from typing import Annotated
      from typing_extensions import TypedDict
```

```
[3]: !pip install arxiv wikipedia
```

Collecting arxiv

Downloading arxiv-2.1.3-py3-none-any.whl.metadata (6.1 kB)

Collecting wikipedia

Downloading wikipedia-1.4.0.tar.gz (27 kB)

Preparing metadata (setup.py) ... done

Collecting feedparser~=6.0.10 (from arxiv)

Downloading feedparser-6.0.11-py3-none-any.whl.metadata (2.4 kB)

Requirement already satisfied: requests~=2.32.0 in

```

/usr/local/lib/python3.10/dist-packages (from arxiv) (2.32.3)
Requirement already satisfied: beautifulsoup4 in /usr/local/lib/python3.10/dist-
packages (from wikipedia) (4.12.3)
Collecting sgmlib3k (from feedparser~=6.0.10->arxiv)
  Downloading sgmlib3k-1.0.0.tar.gz (5.8 kB)
  Preparing metadata (setup.py) ... done
Requirement already satisfied: charset-normalizer<4,>=2 in
/usr/local/lib/python3.10/dist-packages (from requests~=2.32.0->arxiv) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-
packages (from requests~=2.32.0->arxiv) (3.8)
Requirement already satisfied: urllib3<3,>=1.21.1 in
/usr/local/lib/python3.10/dist-packages (from requests~=2.32.0->arxiv) (2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in
/usr/local/lib/python3.10/dist-packages (from requests~=2.32.0->arxiv)
(2024.7.4)
Requirement already satisfied: soupsieve>1.2 in /usr/local/lib/python3.10/dist-
packages (from beautifulsoup4->wikipedia) (2.6)
Downloading arxiv-2.1.3-py3-none-any.whl (11 kB)
Downloading feedparser-6.0.11-py3-none-any.whl (81 kB)
      81.3/81.3 kB
1.5 MB/s eta 0:00:00
Building wheels for collected packages: wikipedia, sgmlib3k
  Building wheel for wikipedia (setup.py) ... done
  Created wheel for wikipedia: filename=wikipedia-1.4.0-py3-none-any.whl
size=11679
sha256=f9c9d789c55e96ab91193c5795a18d55ea6d8cbcfcb61bf0947aa0d77bc29fa
  Stored in directory: /root/.cache/pip/wheels/5e/b6/c5/93f3dec388ae76edc830cb42
901bb0232504dfc0df02fc50de
  Building wheel for sgmlib3k (setup.py) ... done
  Created wheel for sgmlib3k: filename=sgmlib3k-1.0.0-py3-none-any.whl
size=6047
sha256=2c3b94795f8cefad34e5541f0b371f0b10991d0f5fe1b2d9a3fa4dccc009c3ea
  Stored in directory: /root/.cache/pip/wheels/f0/69/93/a47e9d621be168e9e33c7ce6
0524393c0b92ae83cf6c6e89c5
Successfully built wikipedia sgmlib3k
Installing collected packages: sgmlib3k, feedparser, wikipedia, arxiv
Successfully installed arxiv-2.1.3 feedparser-6.0.11 sgmlib3k-1.0.0
wikipedia-1.4.0

```

[4]: *## Working With Tools*

```

from langchain_community.utilities import ArxivAPIWrapper, WikipediaAPIWrapper
from langchain_community.tools import ArxivQueryRun, WikipediaQueryRun

## Arxiv And Wikipedia tools
arxiv_wrapper=ArxivAPIWrapper(top_k_results=1, doc_content_chars_max=300)
arxiv_tool=ArxivQueryRun(api_wrapper=arxiv_wrapper)

```

```
api_wrapper=WikipediaAPIWrapper(top_k_results=1,doc_content_chars_max=300)
wiki_tool=WikipediaQueryRun(api_wrapper=api_wrapper)
```

```
[5]: wiki_tool.invoke("who is Prabhas")
```

```
[5]: "Page: Prabhas\nSummary: Uppalapati Venkata Suryanarayana Prabhas Raju
([paba s] born 23 October 1979), known mononymously as Prabhas, is an Indian
actor who predominantly works in Telugu cinema. He is one of the highest-paid
actors in Indian cinema and has been featured in Forbes India's Celebrity "
```

```
[6]: arxiv_tool.invoke("Attention is all you need")
```

```
[6]: "Published: 2024-07-22\nTitle: Attention Is All You Need But You Don't Need All
Of It For Inference of Large Language Models\nAuthors: Georgy Tyukin, Gbetondji
J-S Dovonon, Jean Kaddour, Pasquale Minervini\nSummary: The inference demand for
LLMs has skyrocketed in recent months, and serving\nmodels with "
```

```
[7]: tools=[wiki_tool]
```

```
[8]: ## Langgraph Application
from langgraph.graph.message import add_messages
class State(TypedDict):
    messages: Annotated[list, add_messages]
```

```
[10]: from langgraph.graph import StateGraph, START, END
from langchain_groq import ChatGroq
from google.colab import userdata

groq_api_key=userdata.get("GROQ_API")

graph_builder= StateGraph(State)
llm=ChatGroq(groq_api_key=groq_api_key,model_name="Gemma2-9b-It")
llm
```

```
[10]: ChatGroq(client=<groq.resources.chat.completions.Completions object at
0x7e7cef355c30>, async_client=<groq.resources.chat.completions.AsyncCompletions
object at 0x7e7cef2ffcd0>, model_name='Gemma2-9b-It',
groq_api_key=SecretStr('*****'))
```

```
[11]: def chatbot(state:State):
    return {"messages": [llm_with_tools.invoke(state["messages"])]}
```

```
[12]: from langgraph.prebuilt import ToolNode,tools_condition
```

```

graph_builder.add_node("chatbot", chatbot)
tool_node = ToolNode(tools=tools)
graph_builder.add_node("tools", tool_node)

graph_builder.add_conditional_edges(
    "chatbot",
    tools_condition,
)
graph_builder.add_edge("tools", "chatbot")
graph_builder.add_edge(START, "chatbot")

graph=graph_builder.compile()

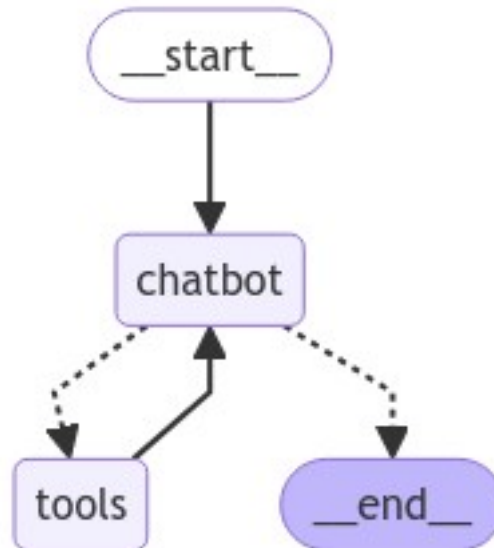
```

```

[13]: from IPython.display import Image, display

try:
    display(Image(graph.get_graph().draw_mermaid_png()))
except Exception:
    # This requires some extra dependencies and is optional
    pass

```



```

[15]: llm_with_tools=llm.bind_tools(tools=tools)

```

```

[16]: user_input="Hi there!, My name is John"

events=graph.stream(
    {"messages": [("user", user_input)]}, stream_mode="values"
)

```

```
)

for event in events:
    event["messages"][-1].pretty_print()
```

===== Human Message

=====

Hi there!, My name is John

===== Ai Message

=====

Tool Calls:

wikipedia (call_pdjc)

Call ID: call_pdjc

Args:

query: John

/usr/local/lib/python3.10/dist-packages/wikipedia/wikipedia.py:389:
 GessedAtParserWarning: No parser was explicitly specified, so I'm using the
 best available HTML parser for this system ("lxml"). This usually isn't a
 problem, but if you run this code on another system, or in a different virtual
 environment, it may use a different parser and behave differently.

The code that caused this warning is on line 389 of the file
 /usr/local/lib/python3.10/dist-packages/wikipedia/wikipedia.py. To get rid of
 this warning, pass the additional argument 'features="lxml"' to the
 BeautifulSoup constructor.

```
lis = BeautifulSoup(html).find_all('li')
```

===== Tool Message

=====

Name: wikipedia

No good Wikipedia Search Result was found

===== Ai Message

=====

Tool Calls:

wikipedia (call_20v4)

Call ID: call_20v4

Args:

query: John

/usr/local/lib/python3.10/dist-packages/wikipedia/wikipedia.py:389:
 GessedAtParserWarning: No parser was explicitly specified, so I'm using the
 best available HTML parser for this system ("lxml"). This usually isn't a
 problem, but if you run this code on another system, or in a different virtual

environment, it may use a different parser and behave differently.

The code that caused this warning is on line 389 of the file `/usr/local/lib/python3.10/dist-packages/wikipedia/wikipedia.py`. To get rid of this warning, pass the additional argument `'features="lxml"'` to the BeautifulSoup constructor.

```
lis = BeautifulSoup(html).find_all('li')
```

===== Tool Message

=====

Name: wikipedia

No good Wikipedia Search Result was found

===== Ai Message

=====

Hi John, it's nice to meet you! What can I do for you?

```
[17]: user_input = "what is Cross Entropy?"

# The config is the **second positional argument** to stream() or invoke()!
events = graph.stream(
    {"messages": [("user", user_input)]}, stream_mode="values"
)
for event in events:
    event["messages"][-1].pretty_print()
```

===== Human Message

=====

what is Cross Entropy?

===== Ai Message

=====

Tool Calls:

wikipedia (call_5k8y)

Call ID: call_5k8y

Args:

query: Cross Entropy

===== Tool Message

=====

Name: wikipedia

Page: Cross-entropy

Summary: In information theory, the cross-entropy between two probability

distributions

p

$\{\displaystyle p\}$

and

q

$\{\displaystyle q\}$

, over the same underlying set of events, measures the average
===== Ai Message

=====

Tool Calls:

wikipedia (call_39xp)

Call ID: call_39xp

Args:

query: Cross Entropy

===== Tool Message

=====

Name: wikipedia

Page: Cross-entropy

Summary: In information theory, the cross-entropy between two probability distributions

p

$\{\displaystyle p\}$

and

q

$$q$$

, over the same underlying set of events, measures the average
===== Ai Message

=====

Cross-entropy is a measure of how one probability distribution diverges from a second, reference probability distribution. It is commonly used in machine learning, particularly in classification problems.

[]: