

## LangChain이란 무엇인가?

- LangChain은 대규모 언어 모델(LLM)을 활용하여 응용 프로그램을 개발하기 위한 프레임워크

## 무엇이 가능한가? ChatGPT API와 무엇이 다른가요?

- LangChain: 대화 기록을 유지하고 관리하는 메모리 시스템을 제공
- ChatGPT API: 개발자가 직접 대화 맥락을 관리

```
In [1]: !pip install openai
```

```

Collecting openai
  Downloading openai-1.44.1-py3-none-any.whl.metadata (22 kB)
Requirement already satisfied: anyio<5,>=3.5.0 in /usr/local/lib/python3.10/dist-packages (from openai) (3.7.1)
Requirement already satisfied: distro<2,>=1.7.0 in /usr/lib/python3/dist-packages (from openai) (1.7.0)
Collecting httpx<1,>=0.23.0 (from openai)
  Downloading httpx-0.27.2-py3-none-any.whl.metadata (7.1 kB)
Collecting jiter<1,>=0.4.0 (from openai)
  Downloading jiter-0.5.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (3.6 kB)
Requirement already satisfied: pydantic<3,>=1.9.0 in /usr/local/lib/python3.10/dist-packages (from openai) (2.8.2)
Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-packages (from openai) (1.3.1)
Requirement already satisfied: tqdm>4 in /usr/local/lib/python3.10/dist-packages (from openai) (4.66.5)
Requirement already satisfied: typing-extensions<5,>=4.11 in /usr/local/lib/python3.10/dist-packages (from openai) (4.12.2)
Requirement already satisfied: idna>=2.8 in /usr/local/lib/python3.10/dist-packages (from anyio<5,>=3.5.0->openai) (3.8)
Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio<5,>=3.5.0->openai) (1.2.2)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->openai) (2024.8.30)
Collecting httpcore==1.* (from httpx<1,>=0.23.0->openai)
  Downloading httpcore-1.0.5-py3-none-any.whl.metadata (20 kB)
Collecting h11<0.15,>=0.13 (from httpcore==1.*->httpx<1,>=0.23.0->openai)
  Downloading h11-0.14.0-py3-none-any.whl.metadata (8.2 kB)
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Requirement already satisfied: pydantic-core==2.20.1 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1.9.0->openai) (2.20.1)
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Downloading httpx-0.27.2-py3-none-any.whl (76 kB)
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Downloading jiter-0.5.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (318 kB)
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Downloading h11-0.14.0-py3-none-any.whl (58 kB)
_____ 58.3/58.3 kB 2.8 MB/s eta 0:00:00
Installing collected packages: jiter, h11, httpcore, httpx, openai
Successfully installed h11-0.14.0 httpcore-1.0.5 httpx-0.27.2 jiter-0.5.0 openai-1.44.1

```

```

In [2]: !pip install langchain_community
        !pip install langchain

```

Collecting langchain\_community

Downloading langchain\_community-0.2.16-py3-none-any.whl.metadata (2.7 kB)

Requirement already satisfied: PyYAML>=5.3 in /usr/local/lib/python3.10/dist-packages (from langchain\_community) (6.0.2)

Requirement already satisfied: SQLAlchemy<3,>=1.4 in /usr/local/lib/python3.10/dist-packages (from langchain\_community) (2.0.32)

Requirement already satisfied: aiohttp<4.0.0,>=3.8.3 in /usr/local/lib/python3.10/dist-packages (from langchain\_community) (3.10.5)

Collecting dataclasses-json<0.7,>=0.5.7 (from langchain\_community)

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Collecting langchain<0.3.0,>=0.2.16 (from langchain\_community)

Downloading langchain-0.2.16-py3-none-any.whl.metadata (7.1 kB)

Collecting langchain-core<0.3.0,>=0.2.38 (from langchain\_community)

Downloading langchain\_core-0.2.39-py3-none-any.whl.metadata (6.2 kB)

Collecting langsmith<0.2.0,>=0.1.0 (from langchain\_community)

Downloading langsmith-0.1.117-py3-none-any.whl.metadata (13 kB)

Requirement already satisfied: numpy<2,>=1 in /usr/local/lib/python3.10/dist-packages (from langchain\_community) (1.26.4)

Requirement already satisfied: requests<3,>=2 in /usr/local/lib/python3.10/dist-packages (from langchain\_community) (2.32.3)

Collecting tenacity!=8.4.0,<9.0.0,>=8.1.0 (from langchain\_community)

Downloading tenacity-8.5.0-py3-none-any.whl.metadata (1.2 kB)

Requirement already satisfied: aiohappyeyeballs>=2.3.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain\_community) (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\_community) (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\_community) (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\_community) (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\_community) (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\_community) (1.9.4)

Requirement already satisfied: async-timeout<5.0,>=4.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain\_community) (4.0.3)

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)

Collecting langchain-text-splitters<0.3.0,>=0.2.0 (from langchain<0.3.0,>=0.2.16->langchain\_community)

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Requirement already satisfied: pydantic<3,>=1 in /usr/local/lib/python3.10/dist-packages (from langchain<0.3.0,>=0.2.16->langchain\_community) (2.8.2)

Collecting jsonpatch<2.0,>=1.33 (from langchain-core<0.3.0,>=0.2.38->langchain\_community)

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Requirement already satisfied: packaging<25,>=23.2 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain\_community) (24.1)

Requirement already satisfied: typing-extensions>=4.7 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain\_community) (4.12.2)

Requirement already satisfied: httpx<1,>=0.23.0 in /usr/local/lib/python3.10/dist-packages (from langsmith<0.2.0,>=0.1.0->langchain\_community) (0.27.2)

Collecting orjson<4.0.0,>=3.9.14 (from langsmith<0.2.0,>=0.1.0->langchain\_community)

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4.whl.metadata (50 kB)

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

Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain\_community) (3.8)

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

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain\_community) (2024.8.30)

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

Requirement already satisfied: anyio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain\_community) (3.7.1)

Requirement already satisfied: httpcore==1.\* in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain\_community) (1.0.5)

Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain\_community) (1.3.1)

Requirement already satisfied: h11<0.15,>=0.13 in /usr/local/lib/python3.10/dist-packages (from httpcore==1.\*->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain\_community) (0.14.0)

Collecting jsonpointer>=1.9 (from jsonpatch<2.0,>=1.33->langchain-core<0.3.0,>=0.2.38->langchain\_community)

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

Requirement already satisfied: annotated-types>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain<0.3.0,>=0.2.16->langchain\_community) (0.7.0)

Requirement already satisfied: pydantic-core==2.20.1 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain<0.3.0,>=0.2.16->langchain\_community) (2.20.1)

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)

Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain\_community) (1.2.2)

Downloading langchain\_community-0.2.16-py3-none-any.whl (2.3 MB)

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Downloading dataclasses\_json-0.6.7-py3-none-any.whl (28 kB)

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Downloading langchain\_core-0.2.39-py3-none-any.whl (396 kB)

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Downloading langsmith-0.1.117-py3-none-any.whl (290 kB)

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

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

Downloading langchain\_text\_splitters-0.2.4-py3-none-any.whl (25 kB)

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

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Downloading typing\_inspect-0.9.0-py3-none-any.whl (8.8 kB)

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

Downloading mypy\_extensions-1.0.0-py3-none-any.whl (4.7 kB)

Installing collected packages: tenacity, orjson, mypy\_extensions, marshmallow, jsonpointer, typing-inspect, jsonpatch, langsmith, dataclasses-json, langchain-core, langchain-text-splitters, 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 jsonpatch-1.33 jsonpointer-3.0.0 langchain-0.2.16 langchain-core-0.2.39 langchain-text-splitters-0.2.4 langchain_community-0.2.16 langsmith-0.1.117 marshmallow-3.22.0 mypy-extensions-1.0.0 orjson-3.10.7 tenacity-8.5.0 typing-inspect-0.9.0
Requirement already satisfied: langchain in /usr/local/lib/python3.10/dist-packages (0.2.16)
Requirement already satisfied: PyYAML>=5.3 in /usr/local/lib/python3.10/dist-packages (from langchain) (6.0.2)
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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)
Requirement already satisfied: langchain-core<0.3.0,>=0.2.38 in /usr/local/lib/python3.10/dist-packages (from langchain) (0.2.39)
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Requirement already satisfied: pydantic<3,>=1 in /usr/local/lib/python3.10/dist-packages (from langchain) (2.8.2)
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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)
Requirement already satisfied: jsonpatch<2.0,>=1.33 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain) (1.33)
Requirement already satisfied: packaging<25,>=23.2 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain) (24.1)
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Requirement already satisfied: orjson<4.0.0,>=3.9.14 in /usr/local/lib/python3.10/dist-packages (from langsmith<0.2.0,>=0.1.17->langchain) (3.10.7)
Requirement already satisfied: annotated-types>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain) (0.7.0)
Requirement already satisfied: pydantic-core==2.20.1 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain) (2.20.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain) (3.3.2)

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Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain) (3.8)

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

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain) (2024.8.30)

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: anyio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (3.7.1)

Requirement already satisfied: httpcore==1.\* in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (1.0.5)

Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (1.3.1)

Requirement already satisfied: h11<0.15,>=0.13 in /usr/local/lib/python3.10/dist-packages (from httpcore==1.\*->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (0.14.0)

Requirement already satisfied: jsonpointer>=1.9 in /usr/local/lib/python3.10/dist-packages (from jsonpatch<2.0,>=1.33->langchain-core<0.3.0,>=0.2.38->langchain) (3.0.0)

Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (1.2.2)

## ChatGPT API

```
In [3]: from openai import OpenAI
import getpass

# API 키를 안전하게 입력받음
API_KEY = getpass.getpass("OpenAI API 키를 입력하세요: ")
```

OpenAI API 키를 입력하세요: .....

```
In [4]: client = OpenAI(api_key=API_KEY)

# 대화 기록을 수동으로 관리
conversation_history = []

def chat(message):
    conversation_history.append({"role": "user", "content": message})

    response = client.chat.completions.create(
        model="gpt-3.5-turbo",
        messages=conversation_history,
        max_tokens=100,
    )

    ai_message = response.choices[0].message.content.strip()
    conversation_history.append({"role": "assistant", "content": ai_message})

    return ai_message

# 첫 번째 대화
msg1 = "안녕하세요!"
print("사용자 : ", msg1)
print(chat(msg1))

# 두 번째 대화
```

```

msg2 = "제 이름은 김철수입니다."
print("사용자 : ", msg2)
print(chat(msg2))

# 세 번째 대화
msg3 = "제 이름이 뭐였죠?"
print("사용자 : ", msg3)
print(chat(msg3))

```

사용자 : 안녕하세요!

안녕하세요! 도와드릴 것이 있나요?

사용자 : 제 이름은 김철수입니다.

안녕하세요, 김철수님! 만나서 반가워요. 어떻게 도와드릴까요?

사용자 : 제 이름이 뭐였죠?

김철수님, 제가 여러분의 이름을 기억할 수는 없지만 항상 여러분을 도와드릴 준비가 되어있습니다. 어떤 도움이 필요하신가요?

## LangChain 메모리 시스템 사용

- LangChain은 자동으로 대화 맥락을 유지하므로, 세번째 질문에서 이름을 기억할 수 있다.

```

In [5]: import os
from getpass import getpass
from langchain.memory import ConversationBufferMemory
from langchain.llms import OpenAI
from langchain.chains import ConversationChain

# API 키 설정
os.environ["OPENAI_API_KEY"] = getpass("OpenAI API 키를 입력하세요: ")

# 메모리 시스템 초기화
# 대화 내용을 순차적으로 저장하는 간단한 메모리 시스템
# 맥락 유지: ConversationBufferMemory를 통해 대화 맥락을 자동으로 유지
memory = ConversationBufferMemory()

# 대화 체인 생성
# 언어 모델, 메모리, 프롬프트 템플릿을 결합한 대화 시스템
conversation = ConversationChain(
    llm=OpenAI(),
    memory=memory,      # 위에서 생성한 메모리 시스템을 사용
    verbose=False       # 상세한 출력을 활성화
)

# 첫 번째 대화
# conversation.predict()를 사용하여 대화를 진행
msg1 = "안녕하세요!"
print("사용자 : ", msg1)
response1 = conversation.predict(input=msg1)
print(response1)

# 두 번째 대화 (이전 대화 맥락 유지)
msg2 = "제 이름은 김철수입니다."
print("사용자 : ", msg2)
response2 = conversation.predict(input=msg2)
print(response2)

# 세 번째 대화 (이름을 기억함)

```

```
response3 = conversation.predict(input="제 이름이 뭐였죠?")
print(response3)
```

OpenAI API 키를 입력하세요: .....

```
<ipython-input-5-2da6eff283f4>:18: LangChainDeprecationWarning: The class `OpenAI`
was deprecated in LangChain 0.0.10 and will be removed in 1.0. An updated version
of the class exists in the langchain-openai package and should be used instead. To
use it run `pip install -U langchain-openai` and import as `from langchain_openai
import OpenAI`.
```

```
llm=OpenAI(),
```

```
<ipython-input-5-2da6eff283f4>:17: LangChainDeprecationWarning: The class `ConversationChain`
was deprecated in LangChain 0.2.7 and will be removed in 1.0. Use RunnableWithMessageHistory:
https://python.langchain.com/v0.2/api\_reference/core/runnables/langchain\_core.runnables.history.RunnableWithMessageHistory.html
instead.
```

```
conversation = ConversationChain(
```

사용자 : 안녕하세요!

안녕하세요! 반가워요. 제 이름은 AI이고, 저는 인공지능 로봇이에요. 혹시 제가 도와드릴 수 있는 게 있나요?

사용자 : 제 이름은 김철수입니다.

반가워요, 김철수님! 제가 알기로 김철수는 대한민국에서 가장 흔한 이름 중 하나예요. 그래서 김철수님이 어느 지역에서 오셨는지 궁금하네요.

죄송해요, 제가 김철수님의 이름을 깜빡했나봐요. 제 이름은 AI예요. 김철수님은 어떤 일을 하시나요?