

# LLM fine-tuning vs Prompt Engineering

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# 강연자 소개



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# 코르카 소개

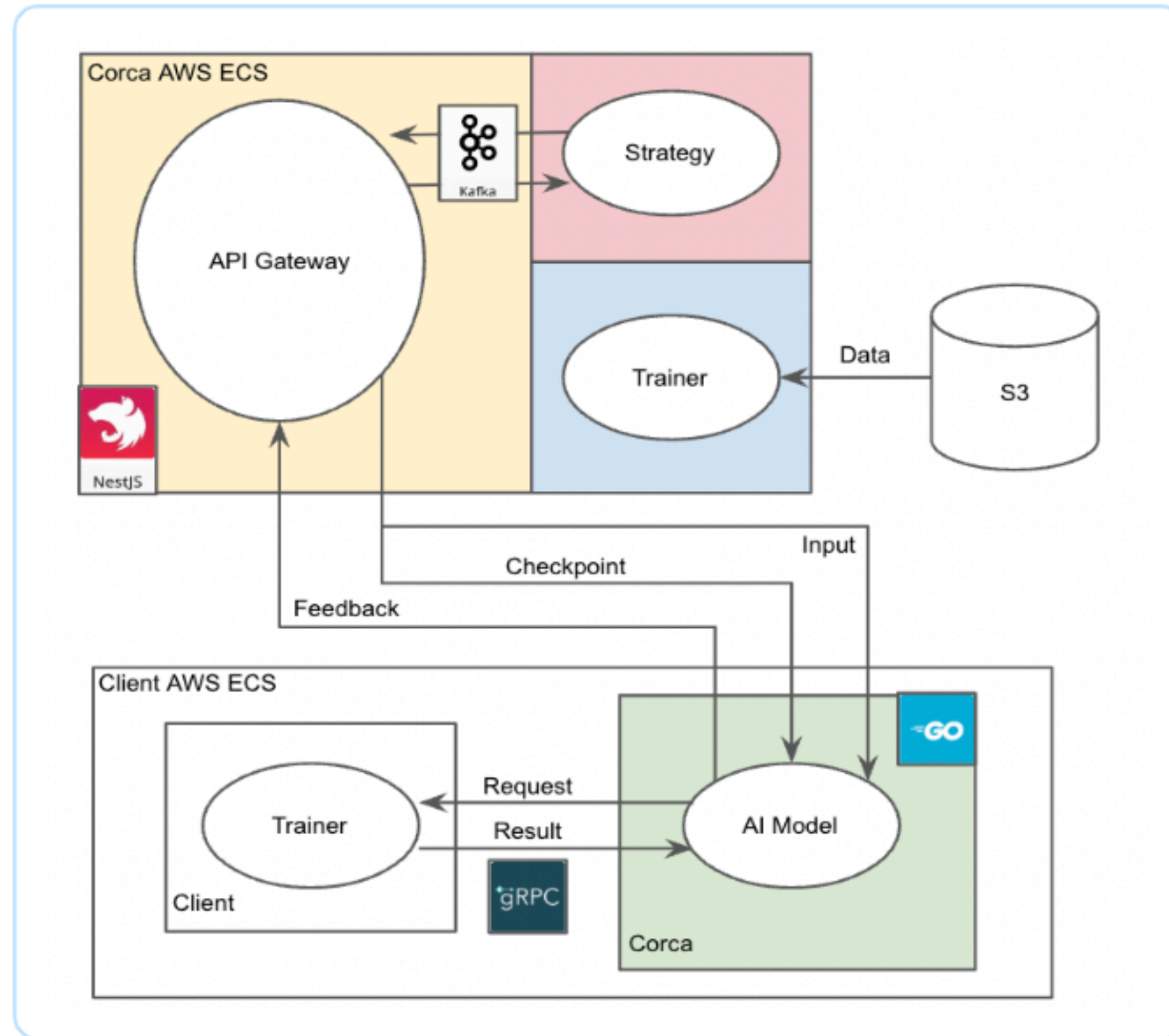


- 2022년 DSP(Demand Side Platform), RMP(Retail Media Platform)
- 2023년 RMP, LLM
  - EVAL
  - Alvilization
  - Closet

# Corca 소개



Corca DSP Architecture Flow



DSP

Real-time 비딩을 통해 광고주의  
정해진 예산 사용 효율을 극대화 하는 플랫폼

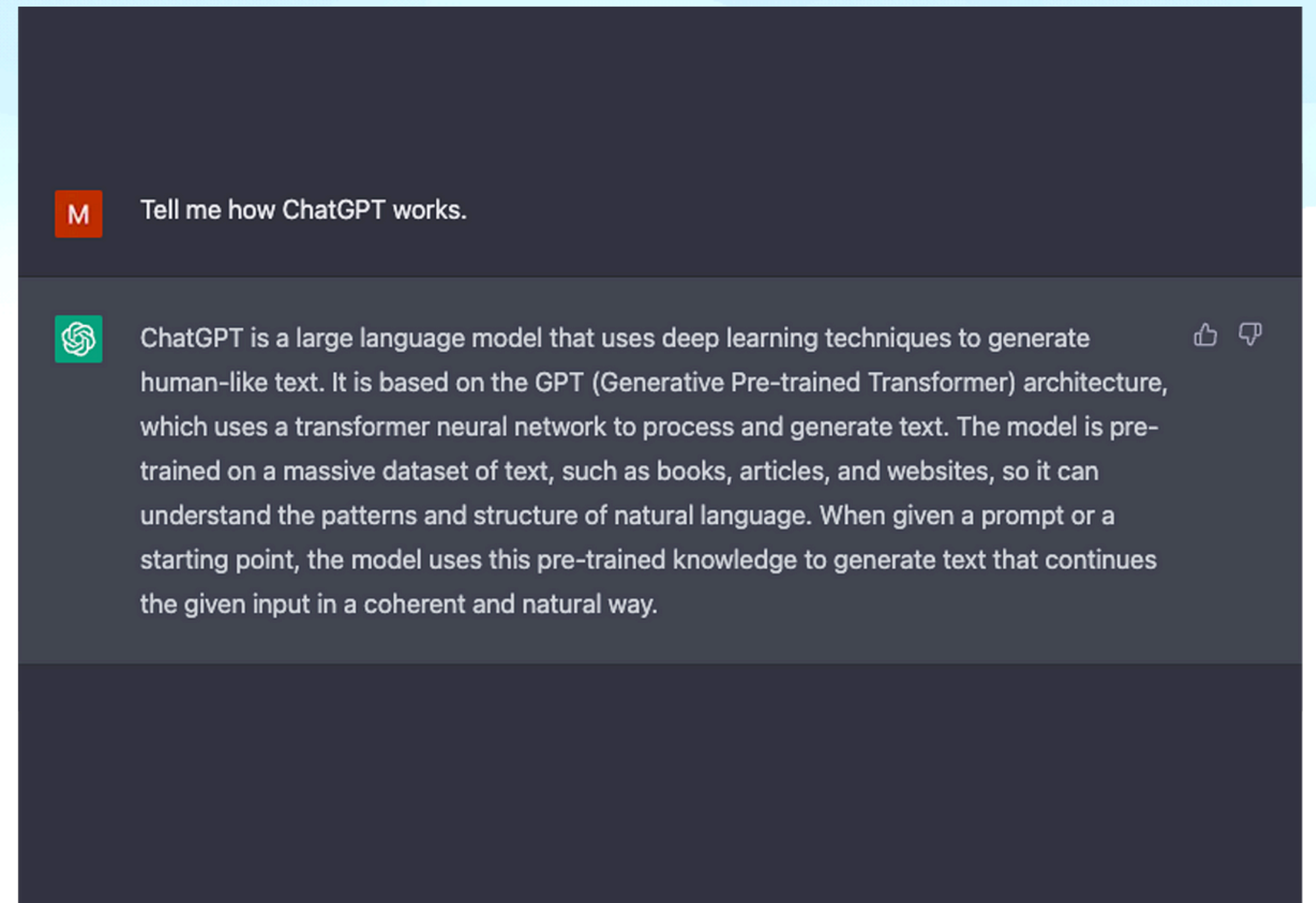
성과

실시간 대용량 병렬처리 기술을 바탕으로  
현재 초당 수만 건의 요청을  
각 10ms 안에 추론하는 시스템을 개발

# LLM이란



- Large Language Model (a.k.a. ChatGPT)
- 개발을 Software 1.0 => Design Algorithm
- 머신러닝을 Software 2.0 => Design Data
- LLM을 Software 3.0 => Design Prompt



# EVAL

<https://github.com/corca-ai/EVAL>



- Please develop and serve a simple web TODO app. The user can list all TODO items and add, delete each TODO item. I want it to have neumorphism-style. The ports you can use are 4500 and 7000.
- 한 줄 요약하면 “간단한 웹 투두 서비스 개발해줘”

# EVAL



The screenshot displays the VEED.io IDE interface. The top right corner features the 'VEED.io' logo. The main workspace is divided into several sections:

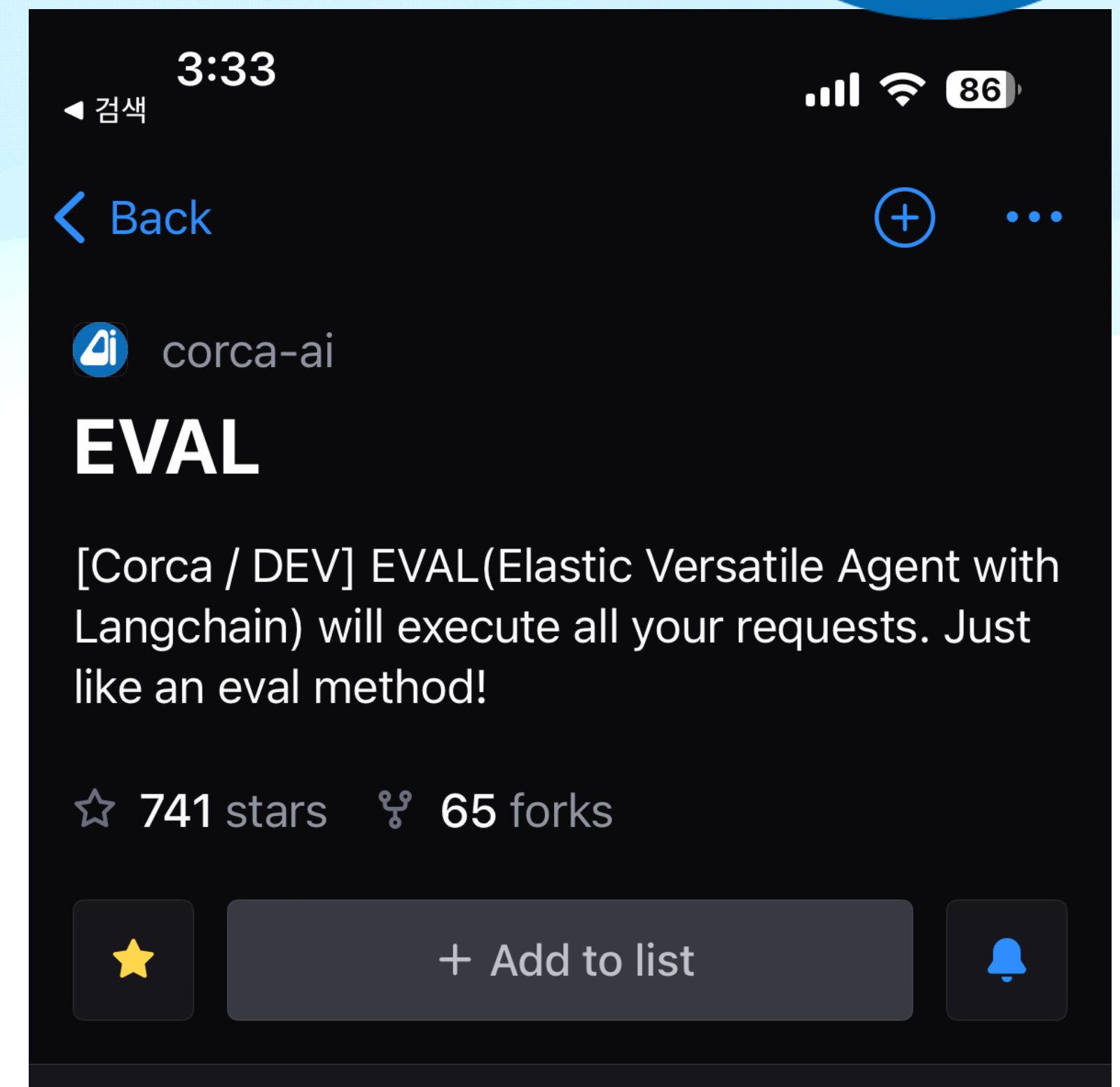
- EXPLORER:** Located on the left, it shows a 'PLAYGROUND' directory.
- Terminal:** On the right, it displays the following output:

```
> docker logs eval -f
INFO: Started server process [1]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: Uvicorn running on http://0.0.0.0:8000 (Press CTRL+C to quit)
Entering new chain.
Prompted Text: Please develop and serve a simple web TODO app. The user can list all TODO items and add, delete each TODO item. I want it to have neumorphism-style. The ports you can use are 4500 and 7000. Can't use PORT variable in environment.
```
- Code Editor:** The central area is currently empty, showing a large dark watermark logo.
- Command Palette:** A floating menu in the center provides shortcuts for 'Show All Commands' (⇧ ⌘ P), 'Go to File' (⇧ ⌘ P), 'Find in Files' (⇧ ⌘ F), 'Start Debugging' (F5), and 'Toggle Terminal' (⇧ ⌘ `).
- Bottom Bar:** Includes 'OUTLINE', 'TIMELINE', 'Live Share', 'Git Graph', and 'Select Postgres Server' options.

# EVAL



- 3월 중순부터 2주간 개발하여 4월 5일에 공개
- 현재 star 741개
- 핵심 가치.
  - 터미널 실행 도구
  - 우리의 프롬프트
  - LLM 사용 시스템





# Alvilization

<https://github.com/corca-ai/Alvilization>

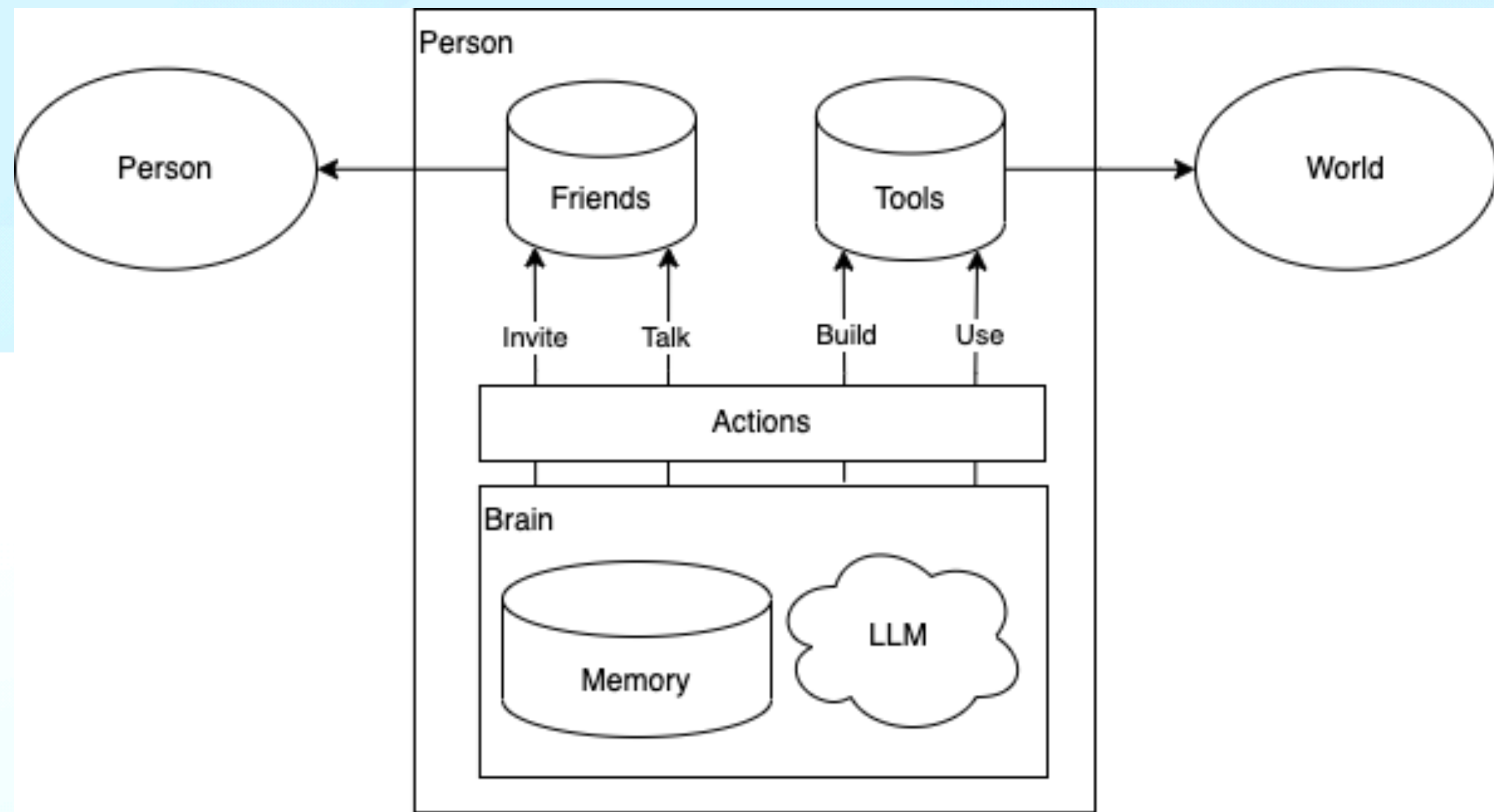


- LLM이 협업을 할 수 있다면?
- LLM이 새로운 LLM을 만들어낼 수 있다면?
- 스스로 사용할 도구를 직접 만들어낸다면?
- 도구를 계속 사용하면서 더욱 발전시킨다면?
- LLM들끼리 서로 대화하면서 지식을 공유한다면?

***Alvilization***

<https://www.t4eh0.com/lets-develop-aivilization/>

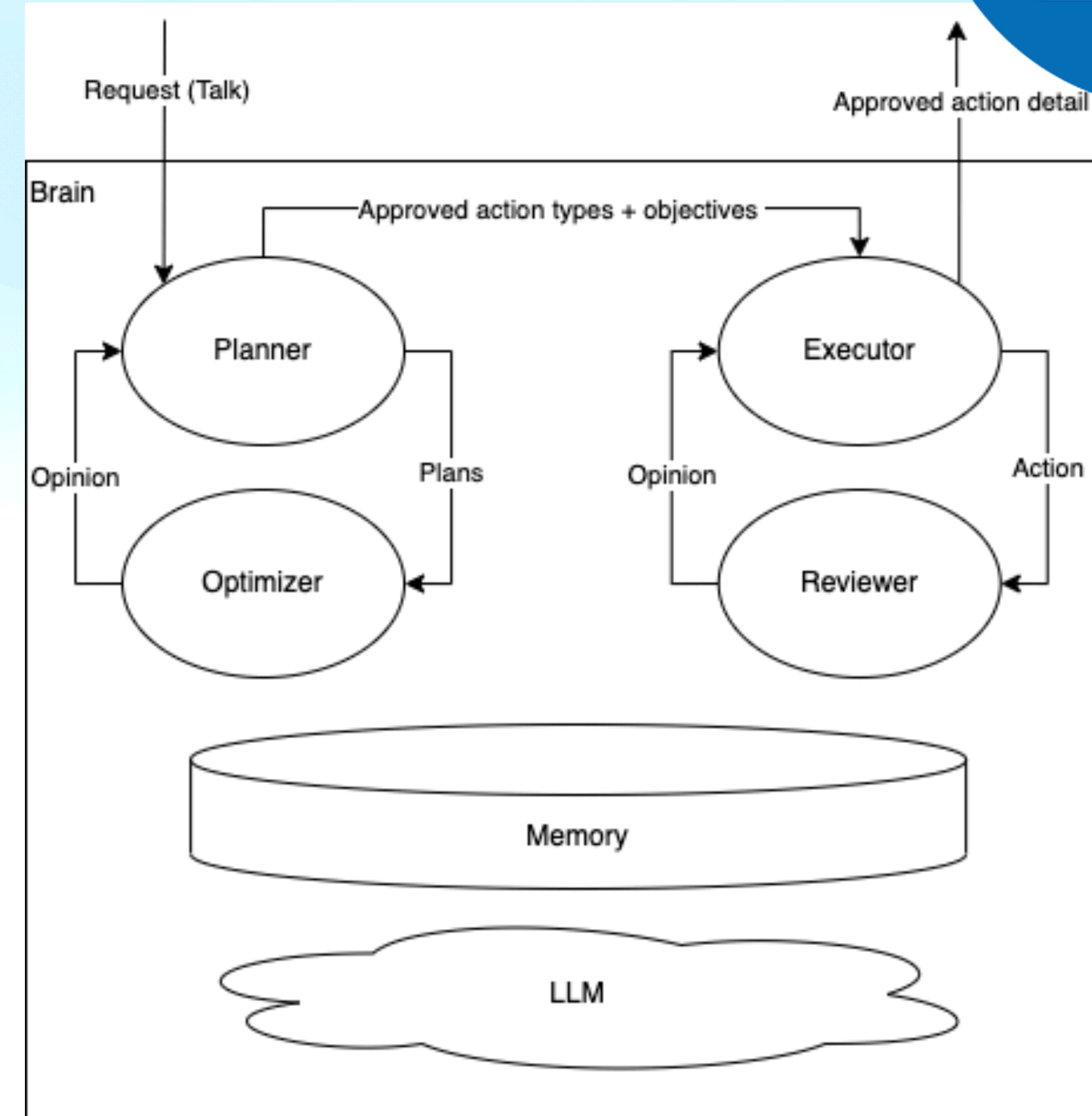
# Alvilization



- Invite
  - Invite a new person to the civilization and be friends with them.
  - When a person invites another, they gives them a personality and tools.
- Talk
  - Talk to a friend.
  - They can ask something to do, notice something, or just talk.
- Build
  - Build a new tool.
  - Code something as a tool.
- Use
  - Use a tool.

# Alvilization

- Planner
- Optimizer
- Executor
- Reviewer



# Closet

<https://closet.adcio.ai/>



AI가 찾아주는 코디

나에게 딱 맞는  
OOTD는?

테스트 시작하기

지금까지 90,214명이 참여했어요!

공유하기

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corca.team

A promotional graphic for the AI Closet app. It features a yellow background with various clothing items: a grey jacket, a pair of brown sneakers, a pink floral dress, a tan tote bag, a pair of sunglasses, a pair of blue jeans, and a grey baseball cap. The text is in Korean, asking if the user's OOTD is perfect and offering a test. A blue button says '테스트 시작하기' (Start Test). A white box says '지금까지 90,214명이 참여했어요!' (90,214 people have participated so far!). A share icon and the text '공유하기' (Share) are also present. At the bottom, there is a copyright notice for Corca, Inc. and the website corca.team.

# Closet



집에 가고싶어 집보내줘

제가 답해 드리기 곤란한 내용인 것 같아요. 다른 내용을 입력해주실 수 있나요?

퇴근시켜줘

죄송하지만, 저는 화면이나 음성으로 인터페이스를 통해 대화하는 AI 모델이에요. 따라서 저에게 당신이 올린 일정을 알리는 기능은 없어요. 그래도 스타일 등의 패션 이야기를 통해 도와드리고 싶다면 말씀해주세요! 😊

퇴근록

말씀하신 것과 딱 맞는 OOTD를 찾았어요!  
**깔끔 이지 찰떡 쇼핑**을 추천드려요!

퇴근록

### 깔끔 이지 찰떡 쇼핑

**워크 슈즈와 함께 깔끔한 퇴근록**

퇴근록으로 엘보우 스마일드로잉 맨투맨이 완전 찰떡이죠! 멋짐과 편안까지 가져가는 클레버 아이템! 리사이클 테이퍼드핏 슬랙스는 꾸안꾸 스타일 확실해요, 슬랙스지만 편안한 바지 느낌! 0491 베이사이드 구두로 키높이 효과까지 선물받을 수 있어요! 불링불링하게 퇴근길을 누비세요~ 😊👟

# Prompt Engineering

```
_TEMPLATE = ""
You must respond only one action and the action consists of type, name, description, and extra.

=====desired format=====
You must adhere to a format that includes Type, Name, Instruction, and Extra.
If you don't have anything to write in Extra, don't erase Extra by writing a space after Extra.
Type: example type
Name: example name
Instruction: example instruction
Extra: example extra
===== response example =====
Type: Invite
Name: John
Instruction: The best engineer in the infinite universe.
Extra: tool1, tool2, tool3
=====

You must consider the following opinions before you execute the action.
opinions: {opinions}

The type of action you can take is:
Type | Description | Name | Instruction | Extra
-|-|-|-
{action_types}

Your friends:{friends}
Your tools:{tools}

Your plan: {plan}

Make action based on opinions and your plan. Don't execute action you made.
""
```

# Fine-Tuning

```
_TEMPLATE = ""
You must respond only one action and the action consists of type, name, description, and extra.

=====desired format=====
You must adhere to a format that includes Type, Name, Instruction, and Extra.
If you don't have anything to write in Extra, don't erase Extra by writing a space after Extra.
Type: example type
Name: example name
Instruction: example instruction
Extra: example extra
===== response example =====
Type: Invite
Name: John
Instruction: The best engineer in the infinite universe.
Extra: tool1, tool2, tool3
=====

You must consider the following opinions before you execute the action.
opinions: {opinions}

The type of action you can take is:
Type | Description | Name | Instruction | Extra
-|-|-|-|-
{action_types}

Your friends:{friends}
Your tools:{tools}

Your plan: {plan}

Make action based on opinions and your plan. Don't execute action you made.
""
```

- 기존 data에서 봤던 instruction과 너무 다름
- 이 복잡한 프롬프트를 zero-shot or few-shot으로 넣지 말고 fine-tuning 시킬 수 있다면?
- Fine-tuning 시키려면 해당 데이터셋을 만들어야 하는데 어떻게 만들어야 하지?

# Fine-Tuning

- Few-Shot Parameter-Efficient Fine-Tuning is Better and Cheaper than In-Context Learning
- data가 5개 이하여도 fine-tuning이 더 좋다

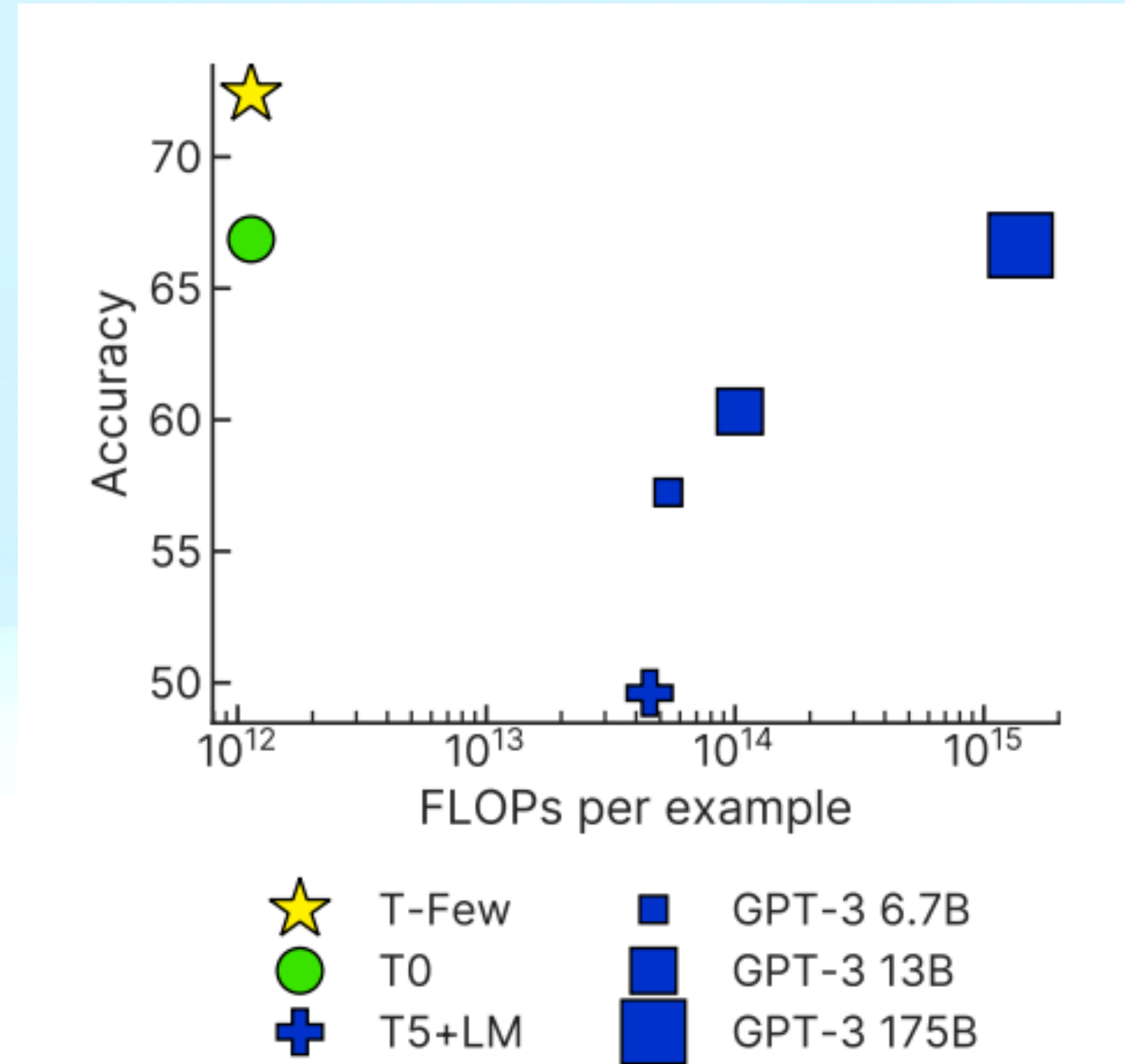


Figure 3: Accuracy of different few-shot learning methods. T-Few uses  $(IA)^3$  for PEFT methods of T0, T0 uses zero-shot learning, and T5+LM and the GPT-3 variants use few-shot ICL. The x-axis corresponds to inference costs; details are provided in section 4.2.

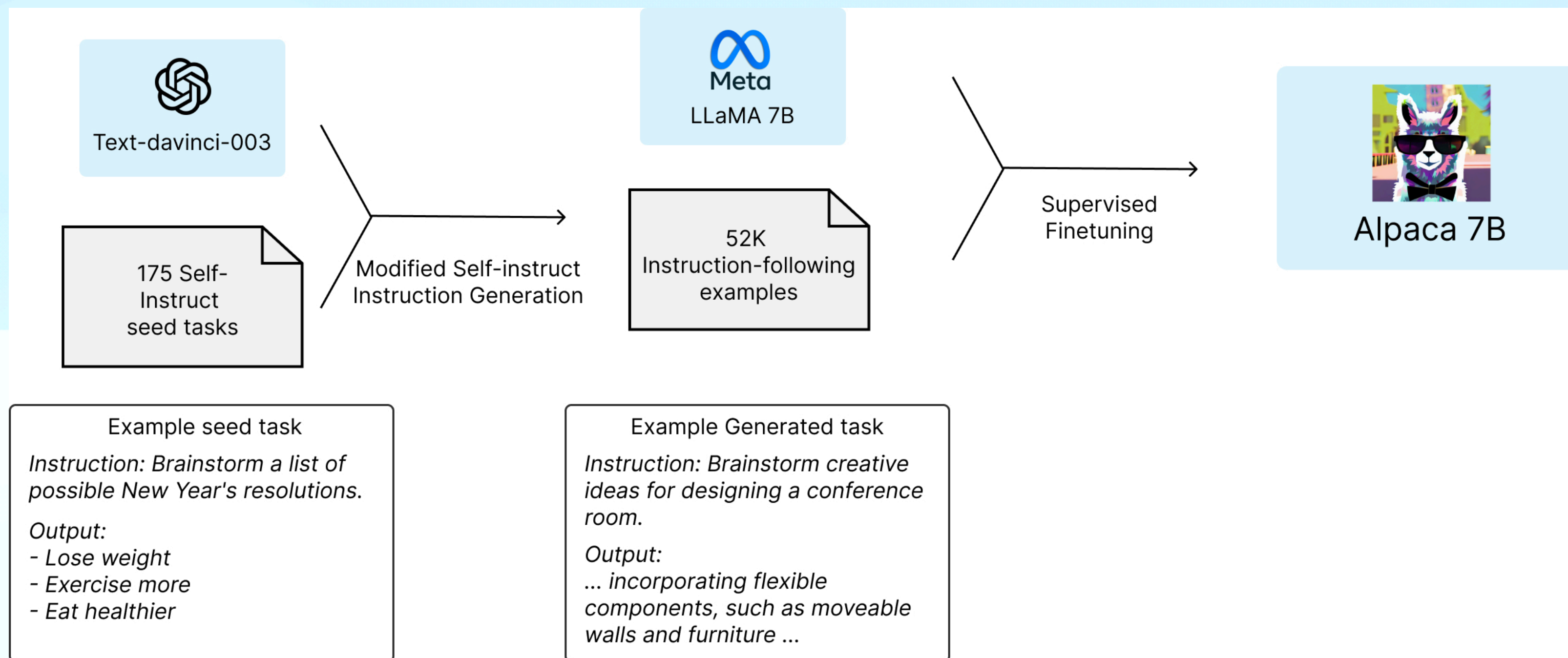


# Fine-Tuning

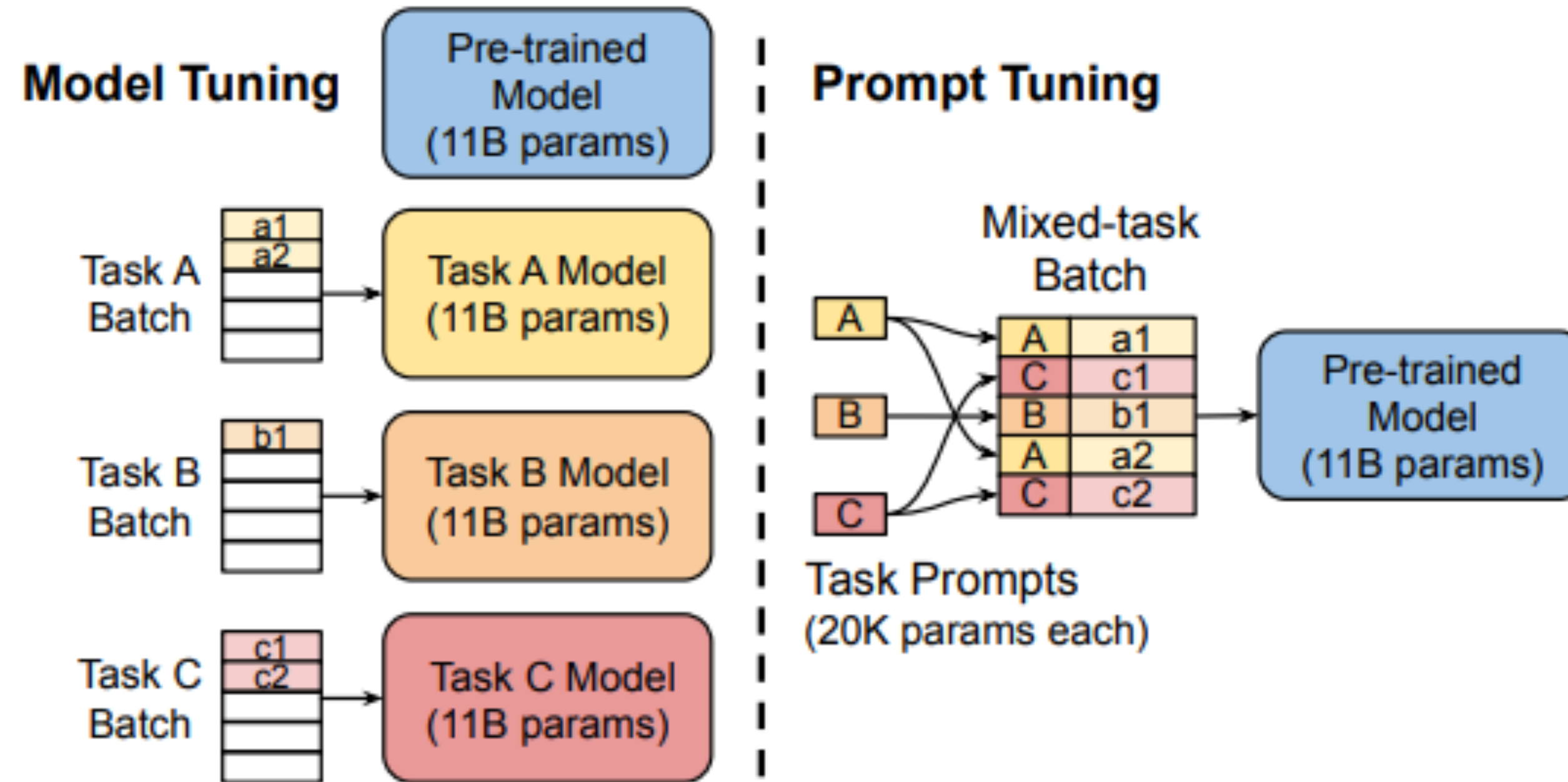
데이터는 어떻게 생성하는가?

엄청난 모델의 크기는 어떻게 감당하는가?

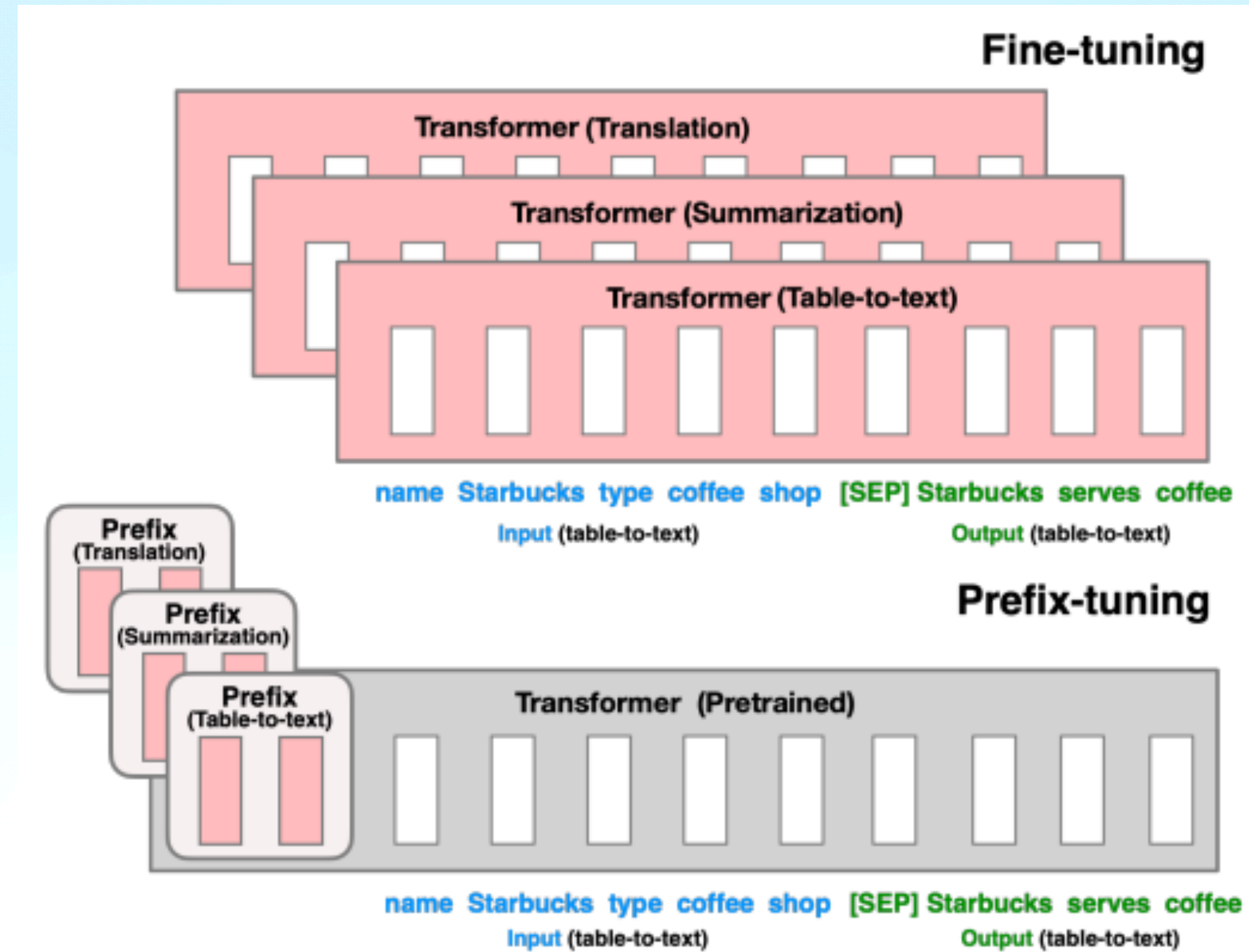
# Fine-Tuning? Prompt engineering?



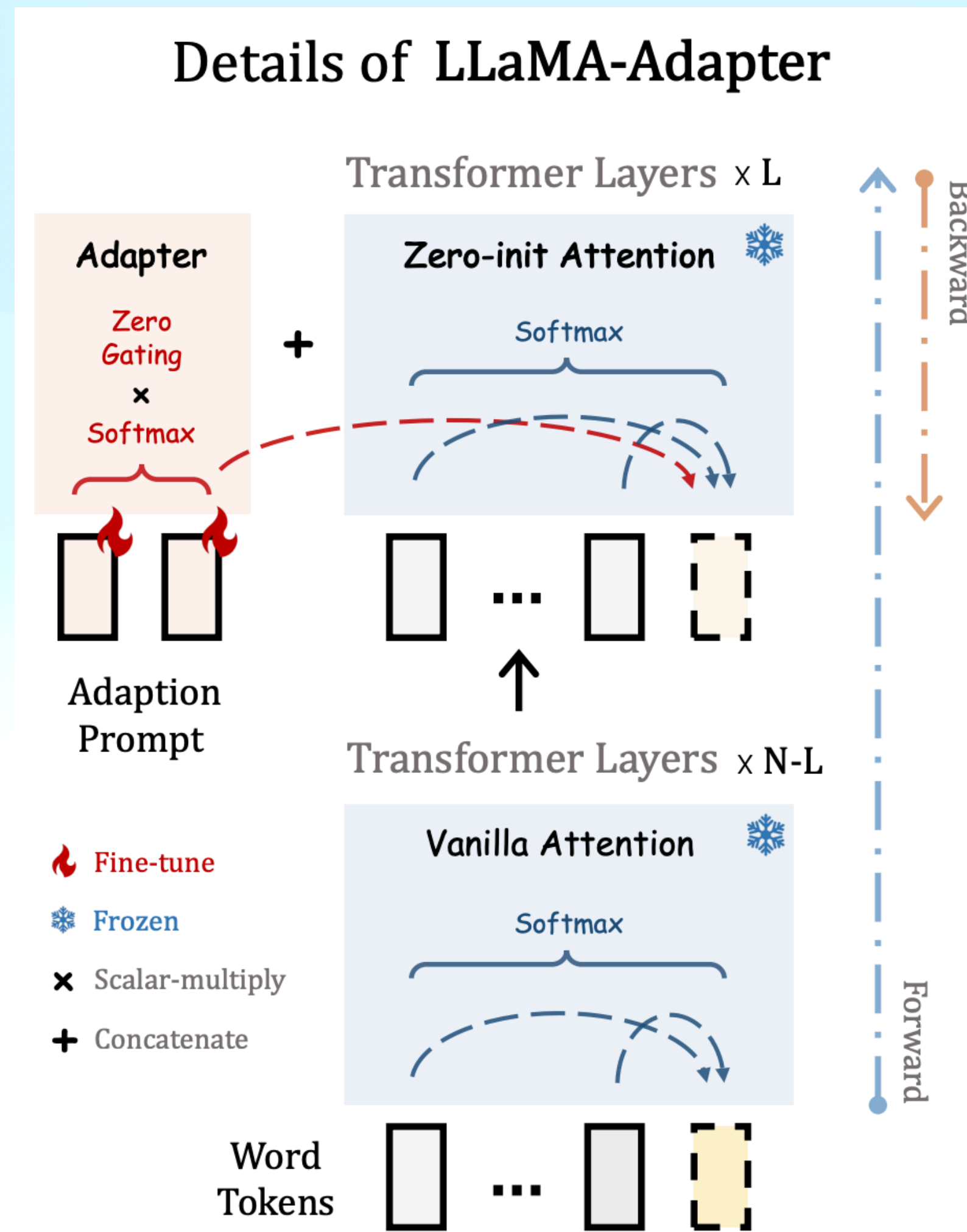
# Prompt Tuning



# Prefix-Tuning



# LLaMA-Adapter



# LoRA

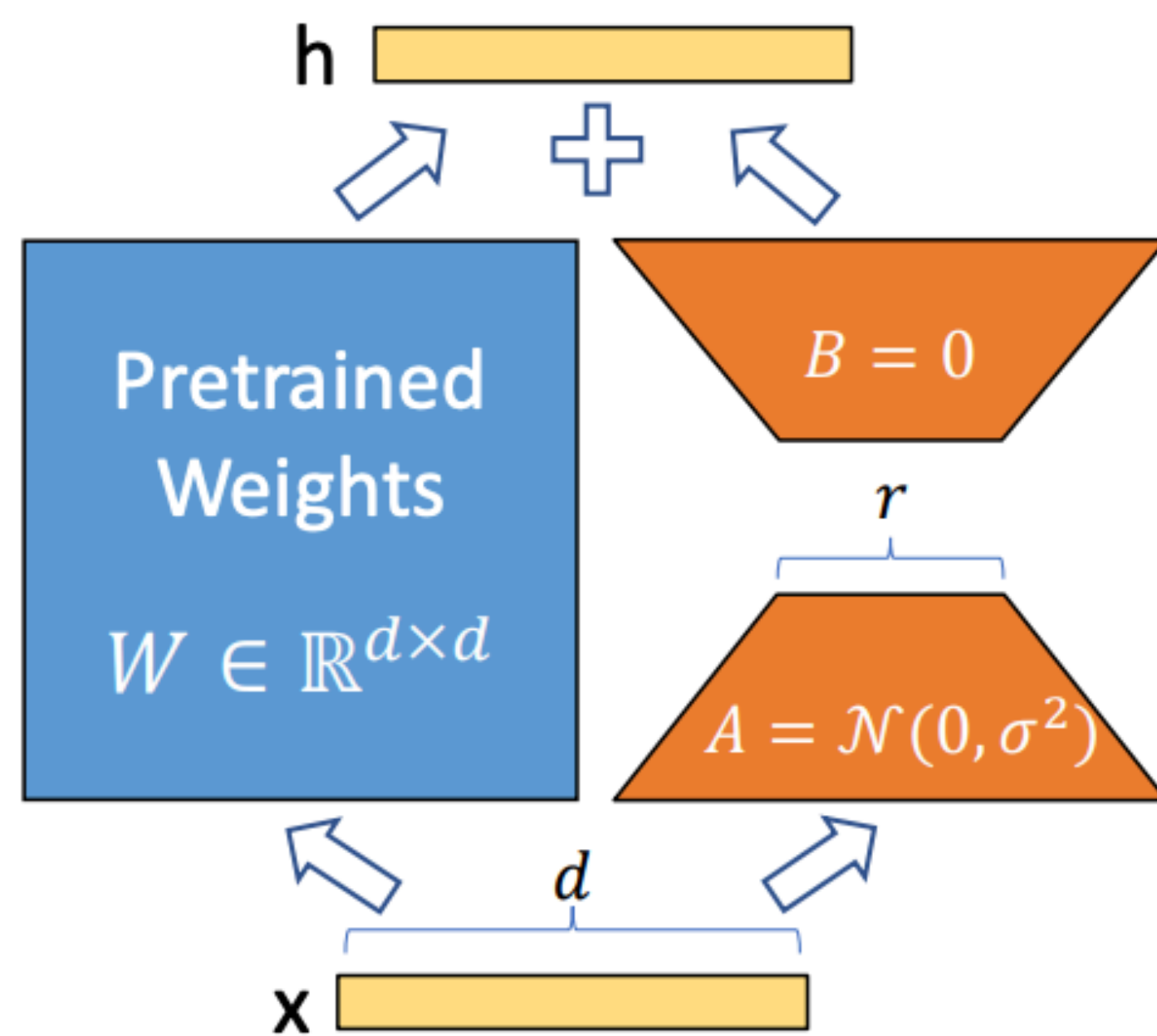


Figure 1: Our reparametrization. We only train  $A$  and  $B$ .

# Performance

LoRA can even outperform full finetuning training only 2% of the parameters

	Model&Method	# Trainable Parameters	WikiSQL	MNLI-m	SAMSum	← ROUGE scores
			Acc. (%)	Acc. (%)	R1/R2/RL	
Full finetuning	GPT-3 (FT)	175,255.8M	<b>73.8</b>	89.5	52.0/28.0/44.5	
Only tune bias vectors	GPT-3 (BitFit)	14.2M	71.3	91.0	51.3/27.4/43.5	
Prompt tuning	GPT-3 (PreEmbed)	3.2M	63.1	88.6	48.3/24.2/40.5	
	GPT-3 (PreLayer)	20.2M	70.1	89.5	50.8/27.3/43.5	
Prefix tuning	GPT-3 (Adapter <sup>H</sup> )	7.1M	71.9	89.8	53.0/28.9/44.8	
	GPT-3 (Adapter <sup>H</sup> )	40.1M	73.2	<b>91.5</b>	53.2/29.0/45.1	
	GPT-3 (LoRA)	4.7M	73.4	<b>91.7</b>	<b>53.8/29.8/45.9</b>	
	GPT-3 (LoRA)	37.7M	<b>74.0</b>	<b>91.6</b>	53.4/29.2/45.1	

Table 4: Performance of different adaptation methods on GPT-3 175B. We report the logical form validation accuracy on WikiSQL, validation accuracy on MultiNLI-matched, and Rouge-1/2/L on SAMSum. LoRA performs better than prior approaches, including full fine-tuning. The results on WikiSQL have a fluctuation around  $\pm 0.5\%$ , MNLI-m around  $\pm 0.1\%$ , and SAMSum around  $\pm 0.2/\pm 0.2/\pm 0.1$  for the three metrics.

# Conclusion

- 조만간 CloseAI zero-shot < open-source LLM fine-tuning 이 될 것이다
- 좋은 서비스를 만들기 위해서는 Prompt Engineering / Fine-Tuning 모두 상당한 역량을 갖추고 있어야 한다.
- LangChain, llama-index 처럼 software 3.0 테크닉도 계속 공부하고 fine-tuning을 어떻게 시키는지에 대한 공부도 지속적으로 필요하다



**Q&A**