Pretraining and Finetuning LLMs from the Ground Up

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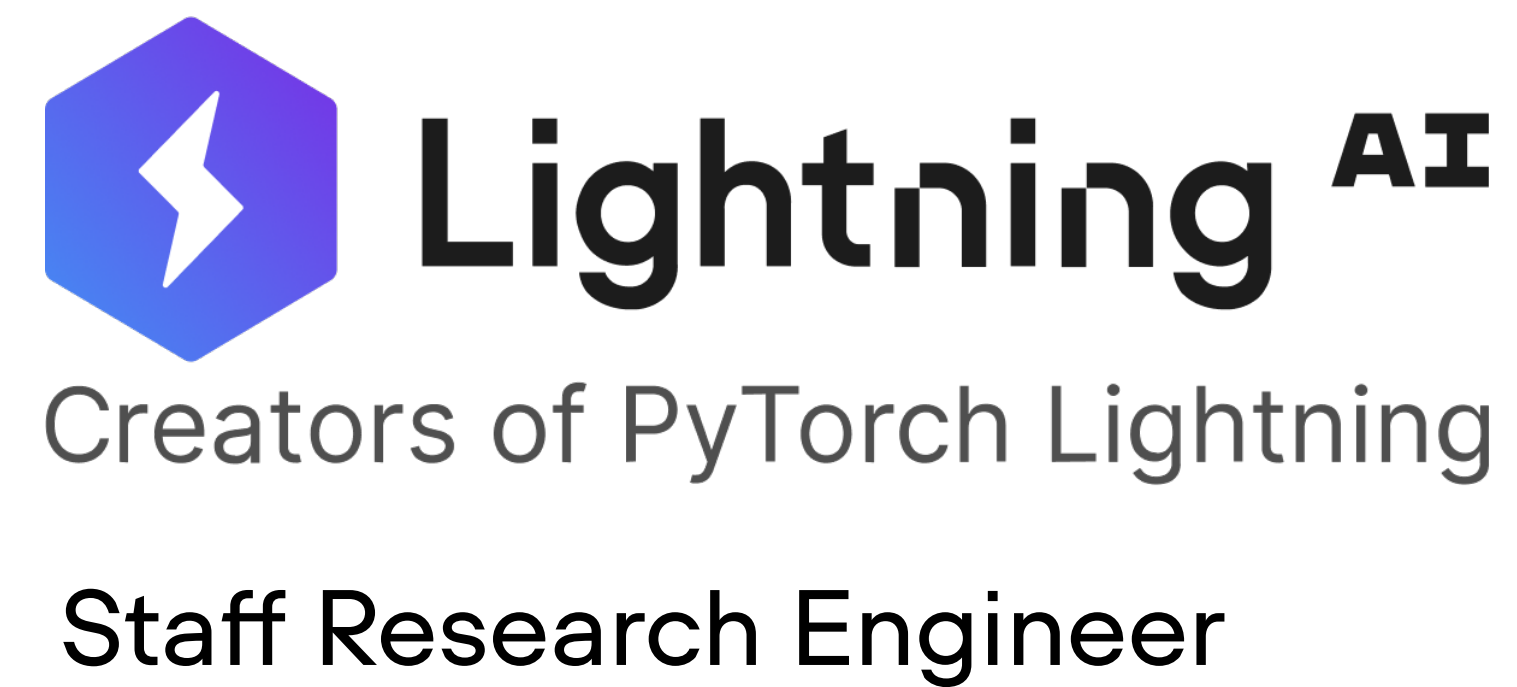
Previously
Asst. Prof. of Statistics

	Workshop topics
1	Introduction to LLMs
2	Understanding LLM input data
3	Coding an LLM architecture
4	Pretraining LLMs
5	Loading pretrained weights
6	Finetuning LLMs

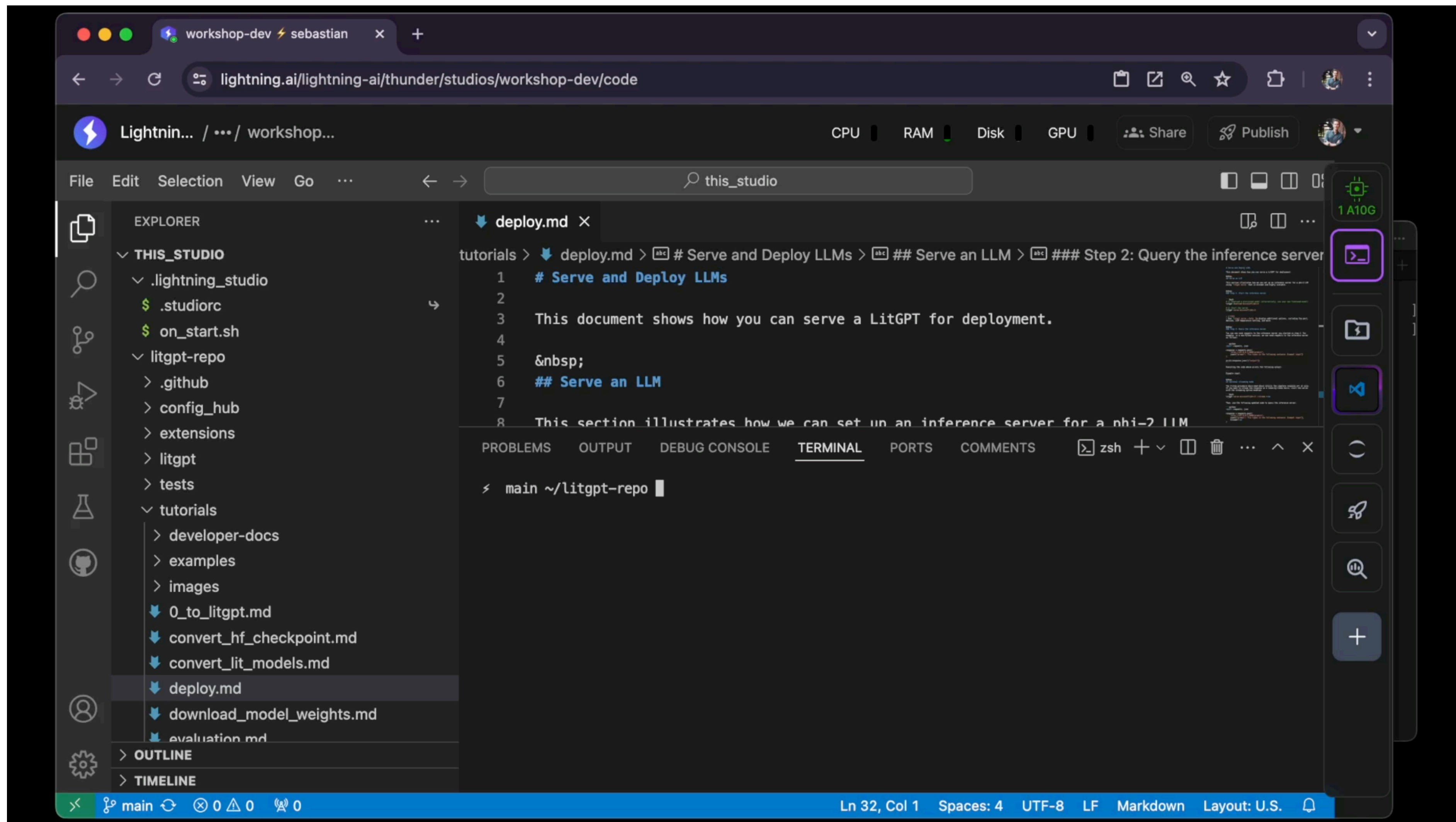# Introduction to Large Language Models (LLMs)

1) Via public & proprietary services
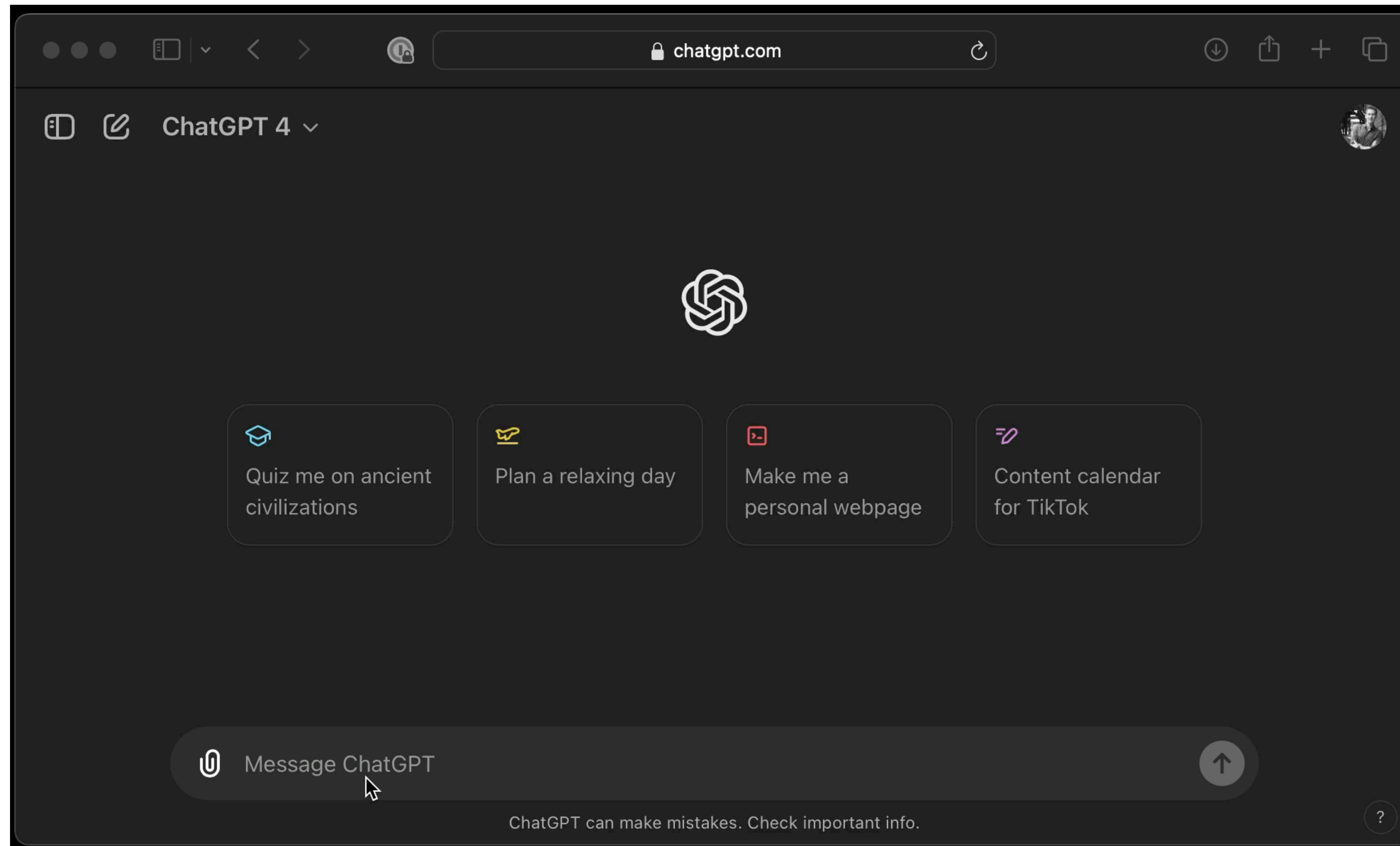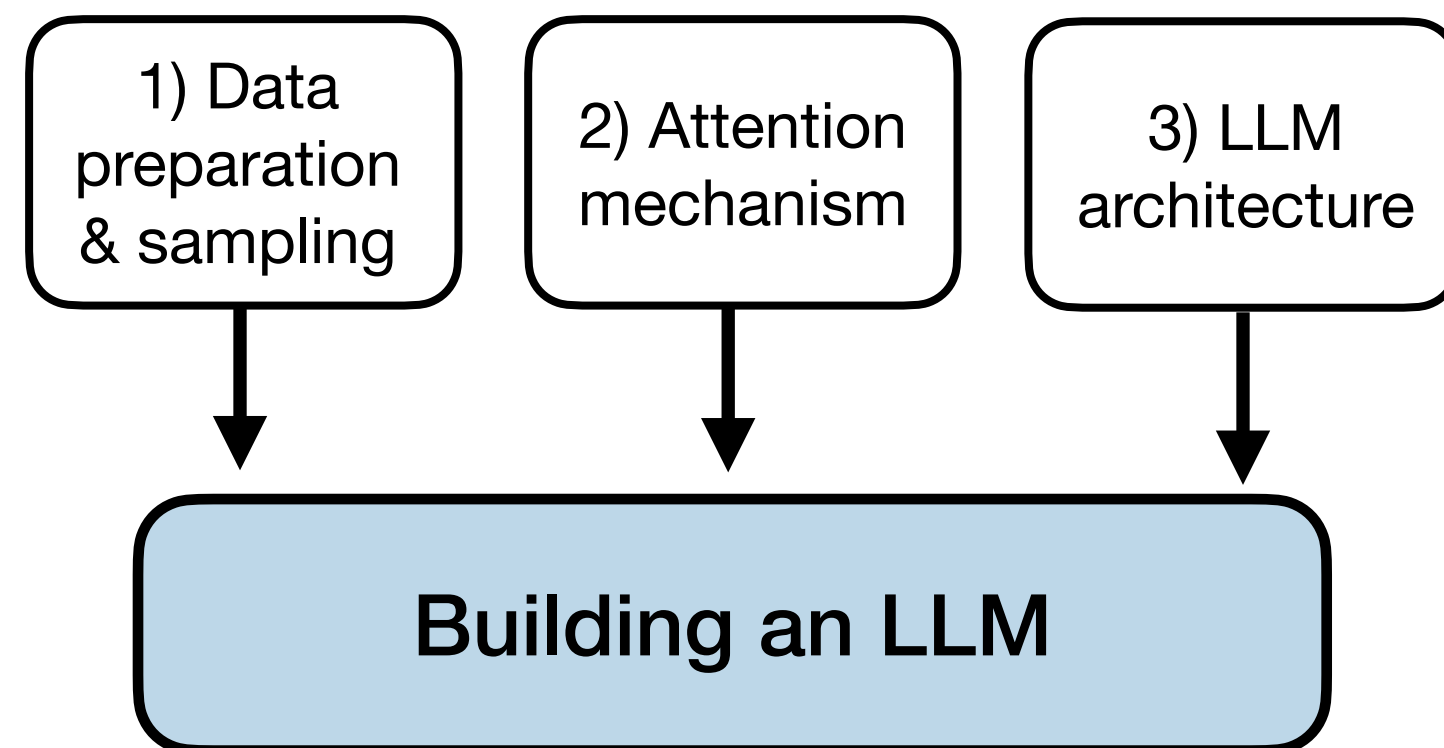
2) Running a (custom) LLM locally
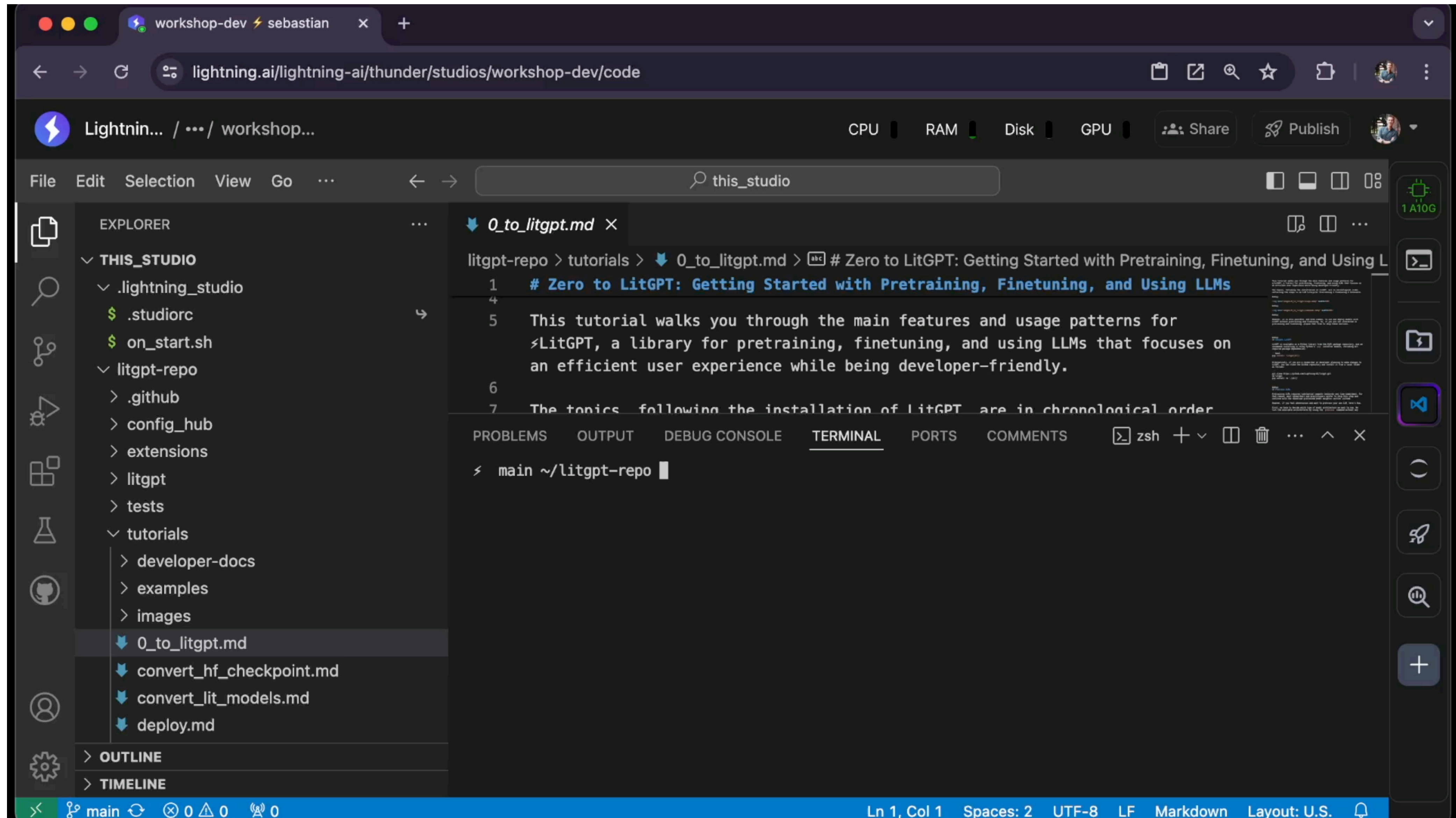
3) Running a (custom) LLM locally

Developing an LLM

STAGE 1: BUILDING

Developing an LLM

STAGE 1: BUILDING

STAGE 2: PRETRAINING

1) Data preparation & sampling

2) Attention mechanism

3) LLM architecture

5) Training loop

6) Model evaluation

7) Load pretrained weights

Building an LLM

4) Pretraining

Foundation model
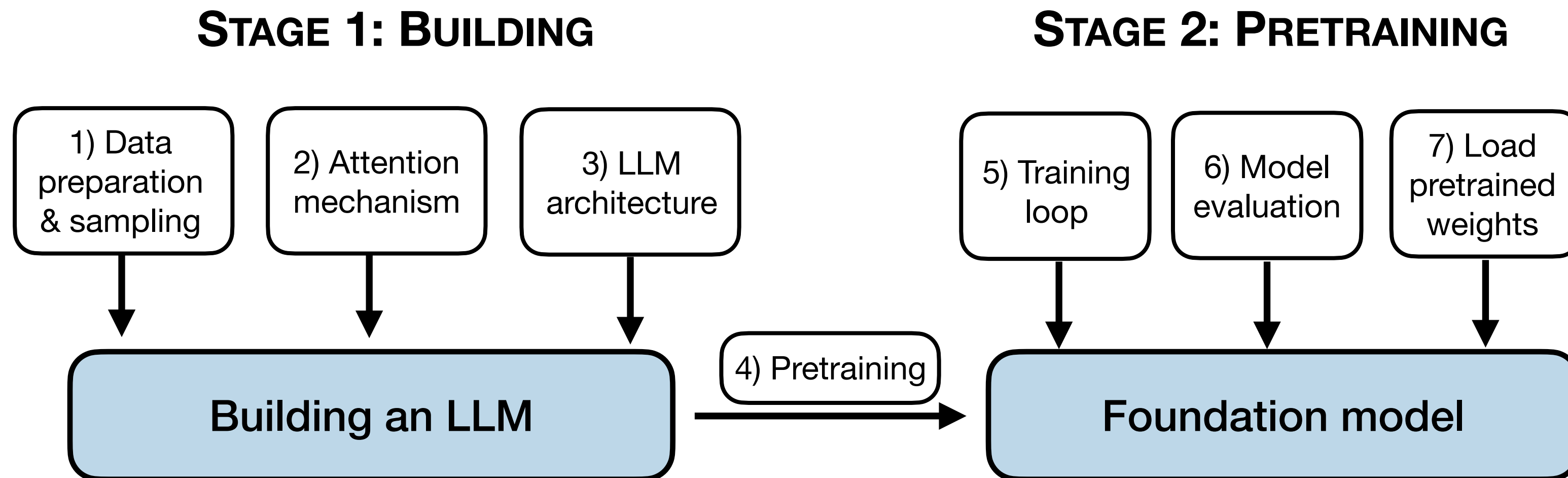
Developing an LLM

Developing an LLM

https://mng.bz/lrp2

https://github.com/rasbt/LLMs-from-scratch
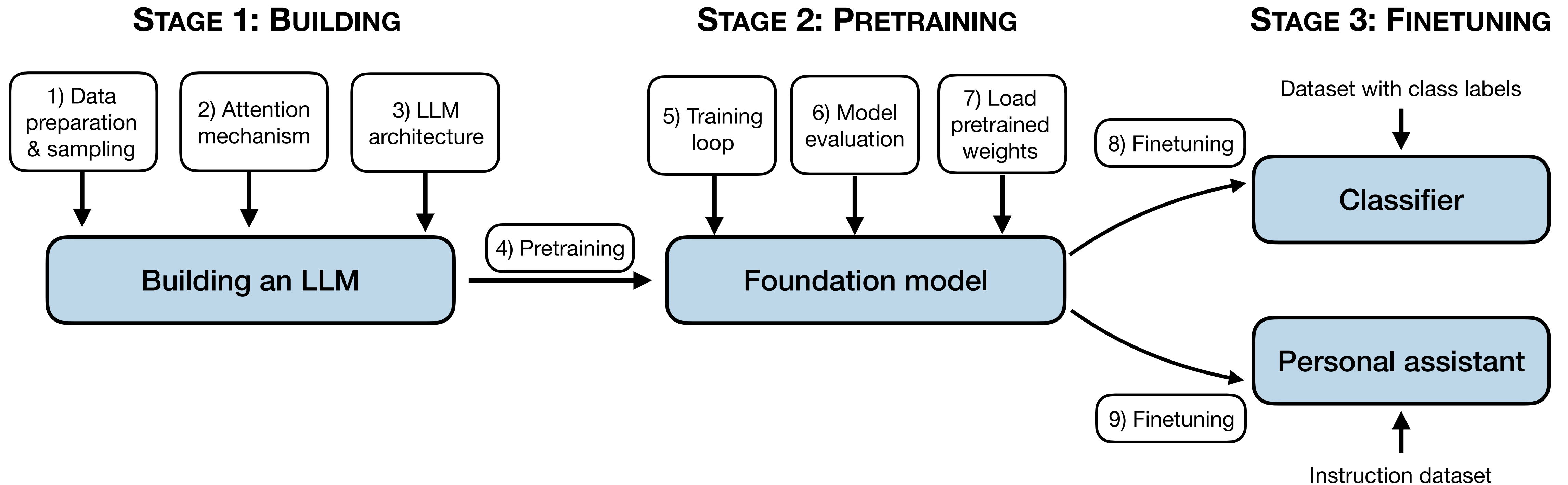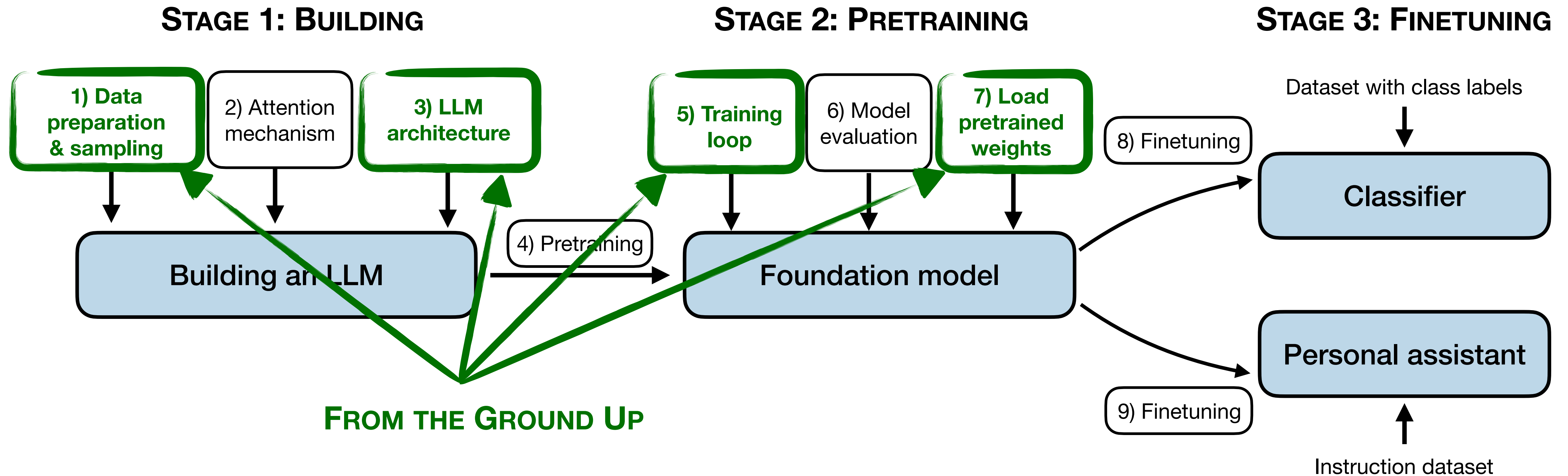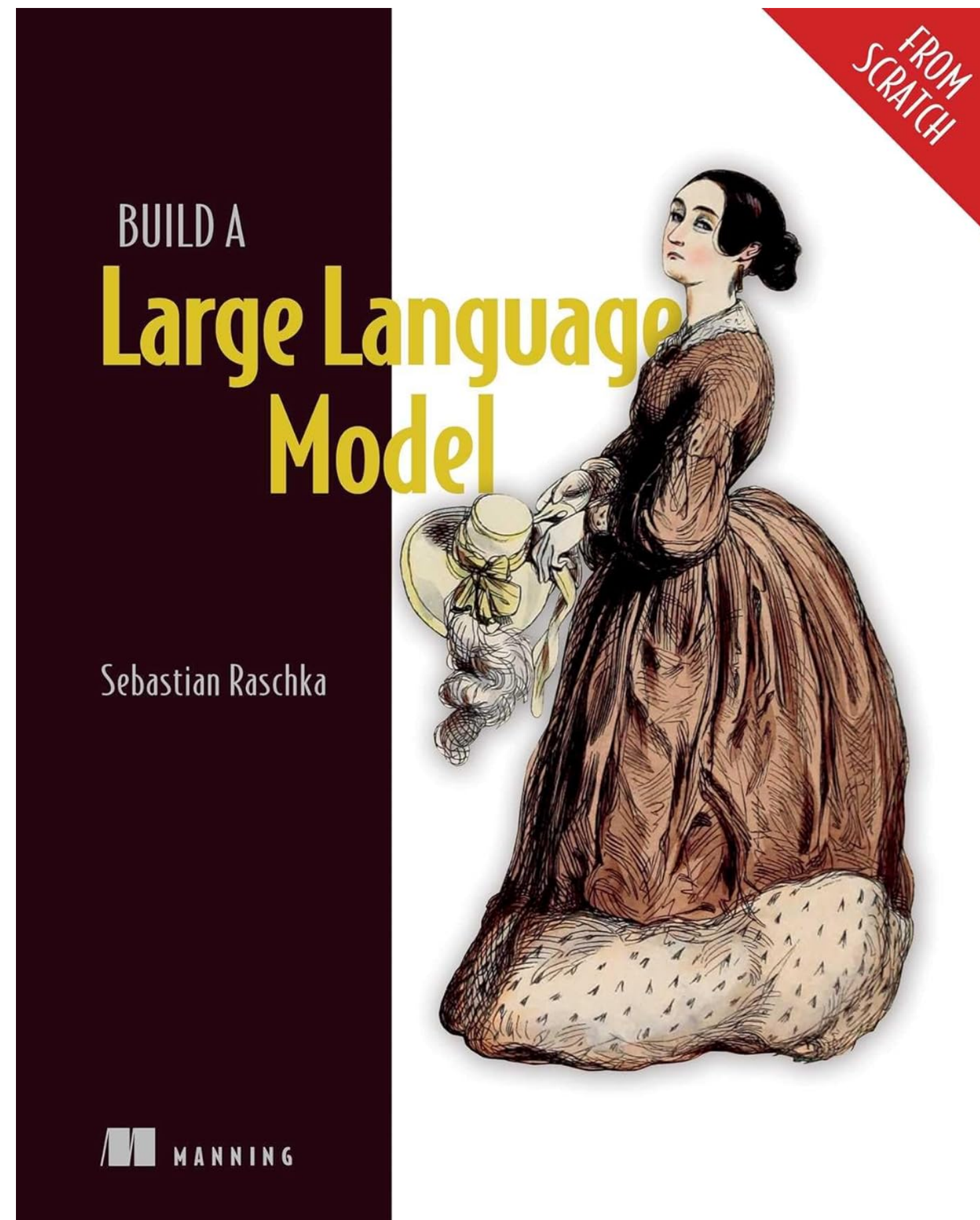
(Source for most figures and code)

Developing an LLM

STAGE 1: BUILDING

STAGE 2: PRETRAINING

STAGE 3: FINETUNING

1) Data preparation & sampling

2) Attention mechanism

3) LLM architecture

5) Training loop

6) Model evaluation

7) Load pretrained weights

8) Finetuning

Dataset with class labels

Building an LLM

4) Pretraining

Foundation model

Classifier

Personal assistant

9) Finetuning

Instruction dataset

WITH LITGPT
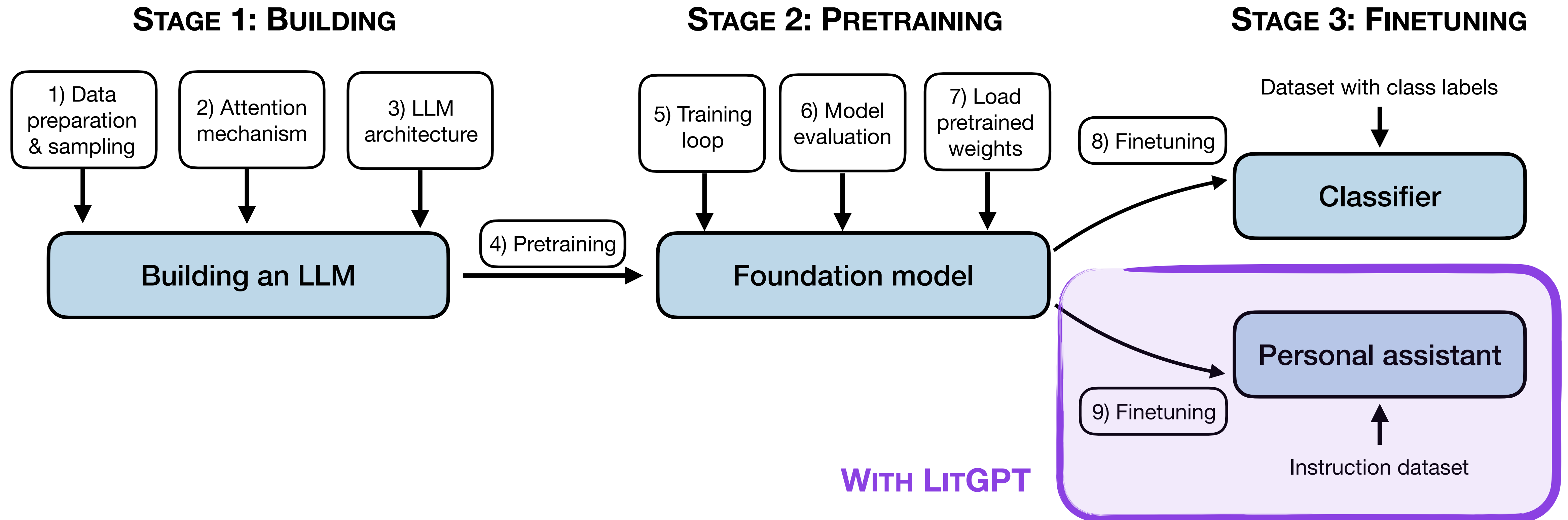
⚡ LitGPT

20+ high-performance LLM implementations with recipes to pretrain, finetune, deploy at scale.

✅ From scratch implementations	✅ No abstractions	✅ Beginner friendly
✅ Flash attention	✅ FSDP	✅ LoRA, QLoRA, Adapter
✅ Reduce GPU memory (fp4/8/16/32)	✅ 1–1000+ GPUs/TPUs	✅ 20+ LLMs

python 3.8 | 3.9 | 3.10 | 3.11   CPU tests passing   License Apache 2.0   chat 988 online

Lightning AI · Quick start · Models · Finetune · Deploy · All workflows · Features · Recipes (YAML) · Tutorials

Get started

https://github.com/Lightning-AI/litgpt

Links

Lightning Studio:

https://lightning.ai/lightning-ai/studios/llms-from-the-ground-up-workshop

GitHub:
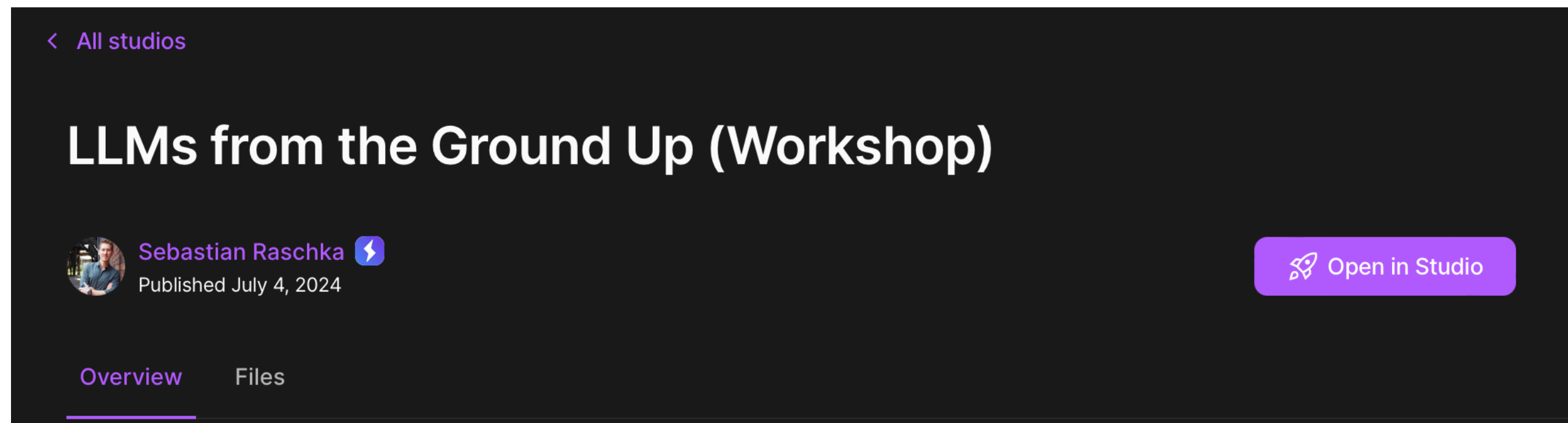
https://github.com/rasbt/LLM-workshop-2024

Setup instructions

Lightning Studio (recommended)

Local: LLM-workshop-2024/setup/