24春学期总结汇报

郭天宇

腾讯实习

- 时间 2024.1-6 地点 深圳
  - 解锁新的人生副本：一个人前往陌生的城市租房住

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- □ 深圳是一个生活节奏很快的城市
  - ➢ 路上行人脚步很快，人行道的非机动车很快，日常的消费也很快

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Overhead of CPU operations

- Current LLM inference framework expect to **maximize** the utilization of GPU gLLM

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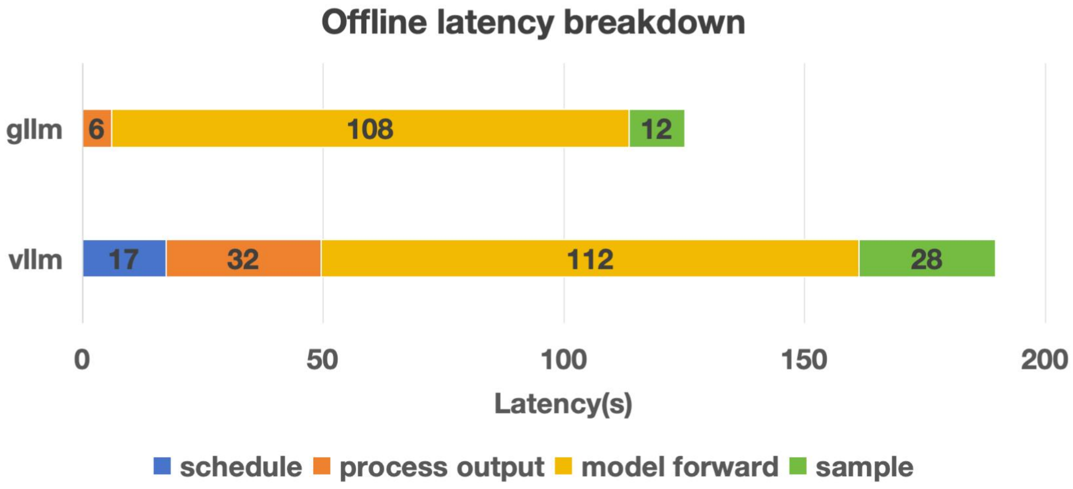

Overhead of CPU operations

gLLM

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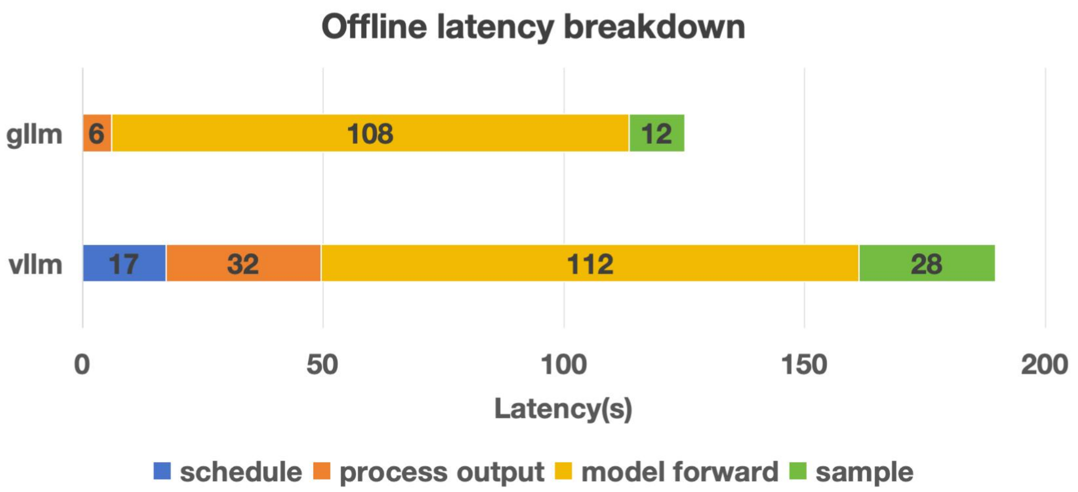
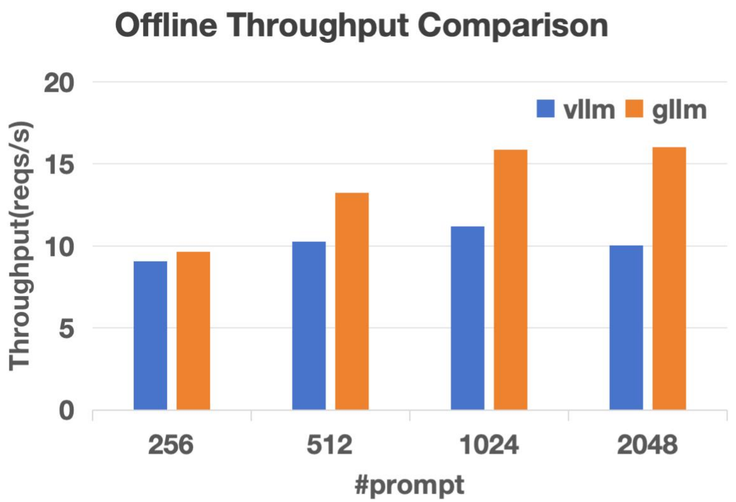
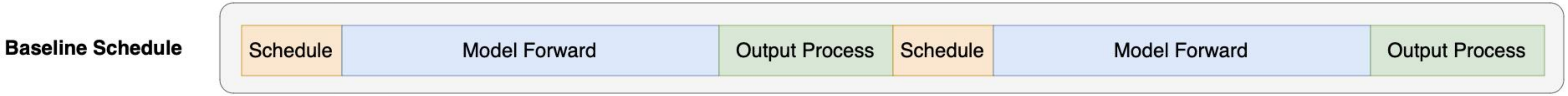
- □ About **25%** of the time is spent on CPU operations
- □ Reduce overhead of CPU opearations can improve performance


Offline latency breakdown


Offline Throughput Comparison

Pipeline Schedule

- Baseline schedule will **serialize** the execution of schedule, model forward and output process



Pipeline Schedule

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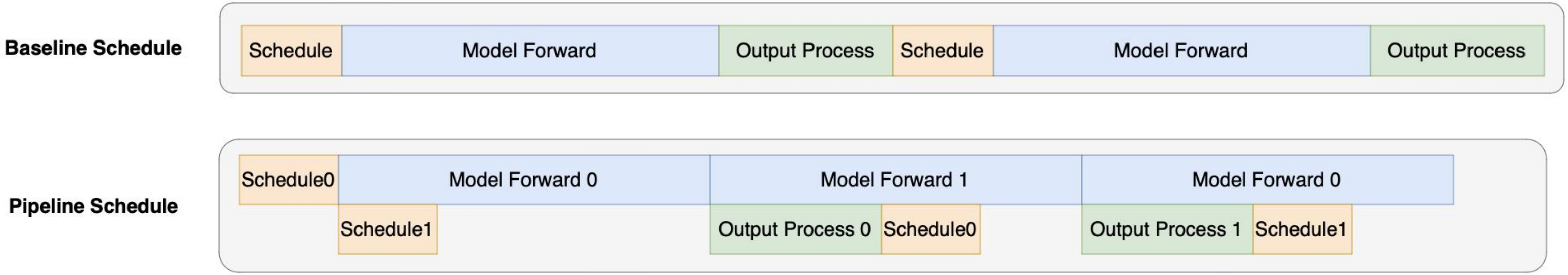
□ Motivated by pipeline parallelism, pipeline schedule is introduced to **overlap** the execution between model forward and other procedure



Problems in Pipeline Schedule

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  - ➢ schedule => model forward => output process => schedule

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□ Careful orchestration addresses **dependencies** between execution phases

- ➢ schedule => model forward => output process => schedule

□ Launch **multi-process** to implement execution overlaps

- ➢ Master process: schedule and output process
- ➢ Worker process: model forward

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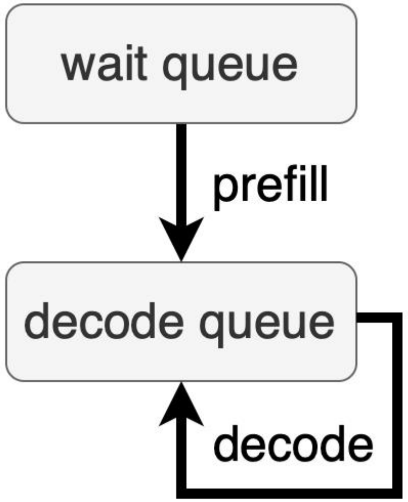

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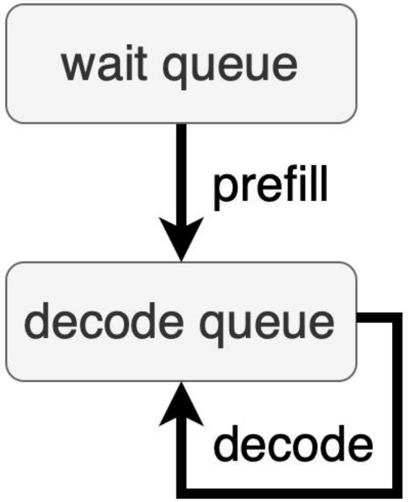

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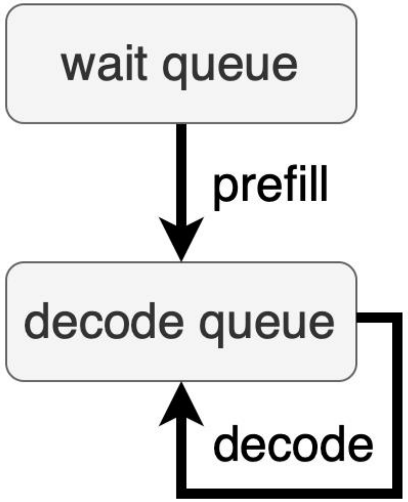
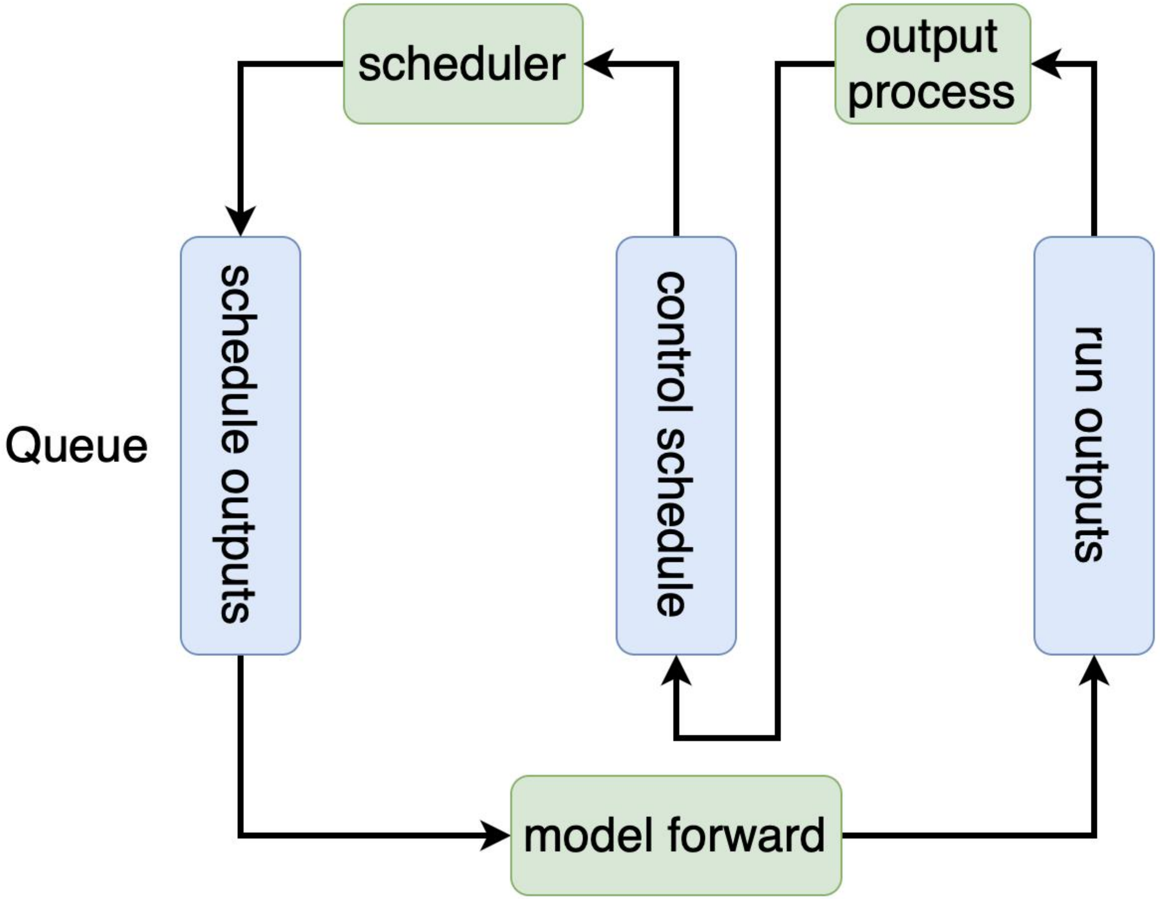


- □ Decode-decode may exhibit unbalanced batching: one schedule 225 seqs and the other schedule 31 seqs
- □ **Delay scheduling** is proposed to merge two unbalanced schedule

Dependency Control

- We can use three queues to control dependency
  - Schedule outputs
  - Run outputs
  - Control schedule



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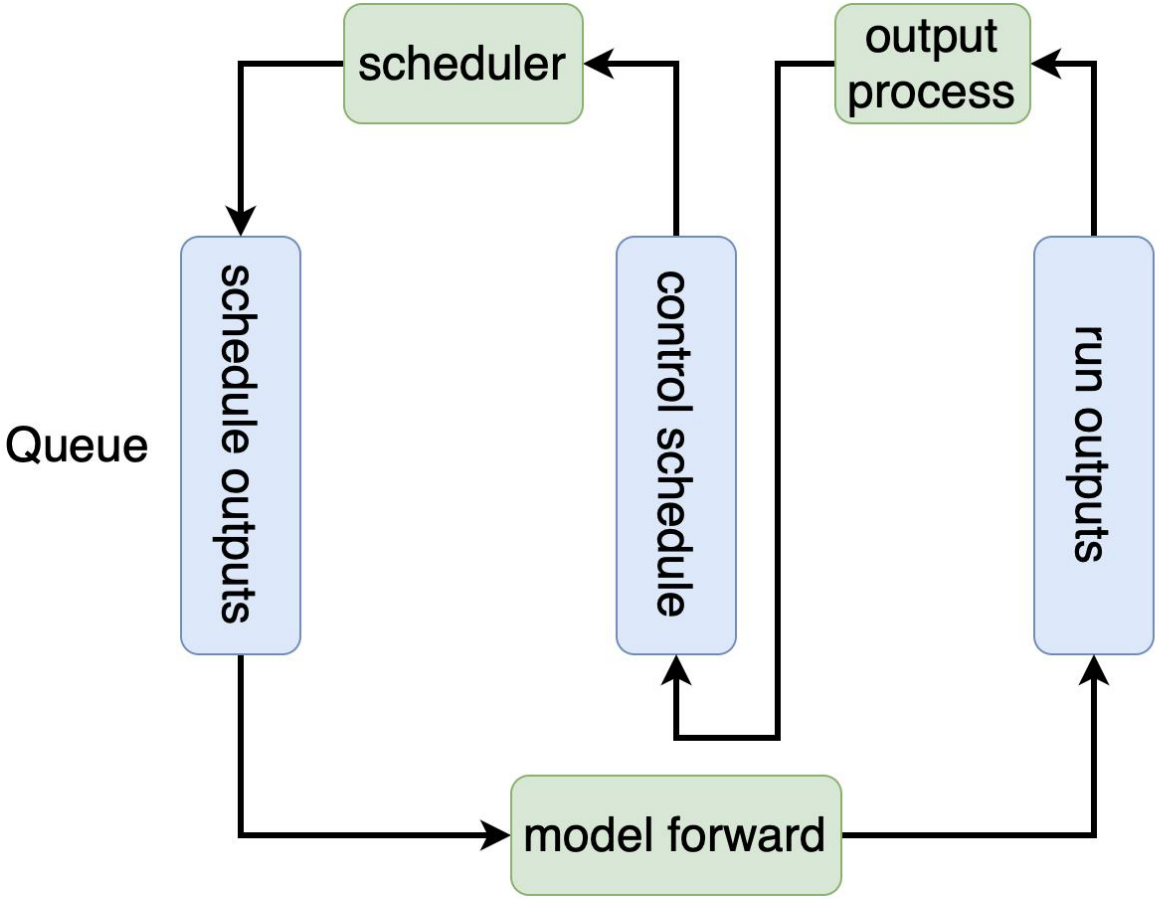

Dependency Control

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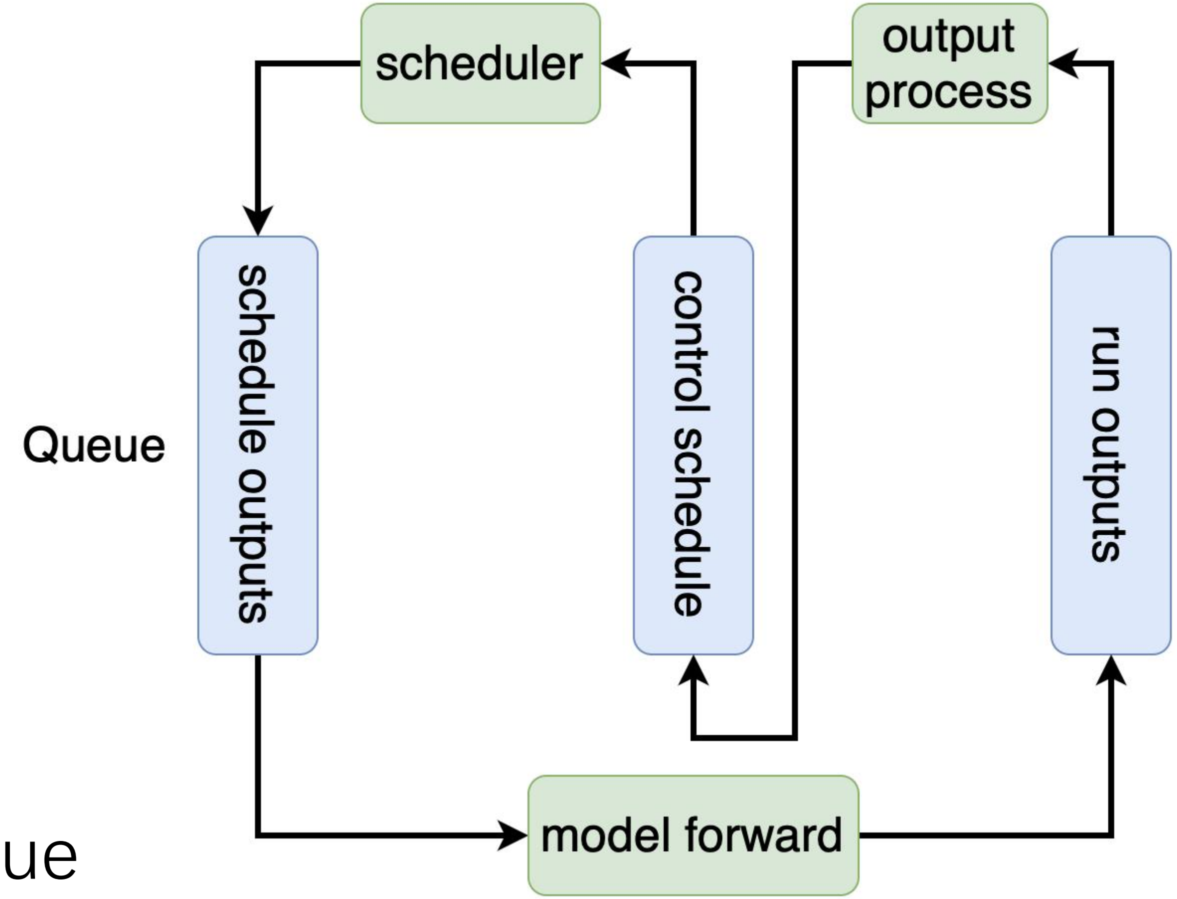

Multi-process

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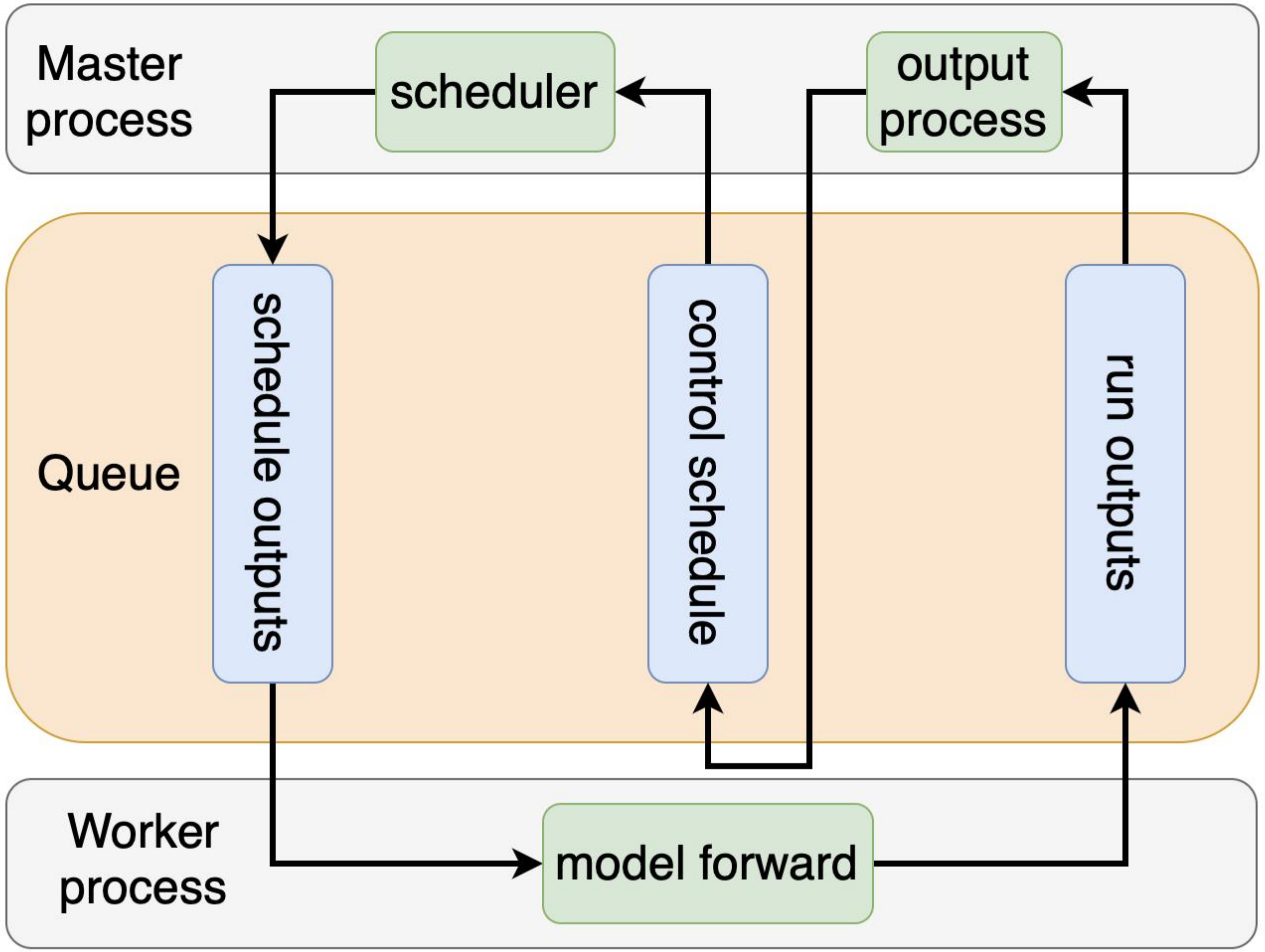

Multi-process

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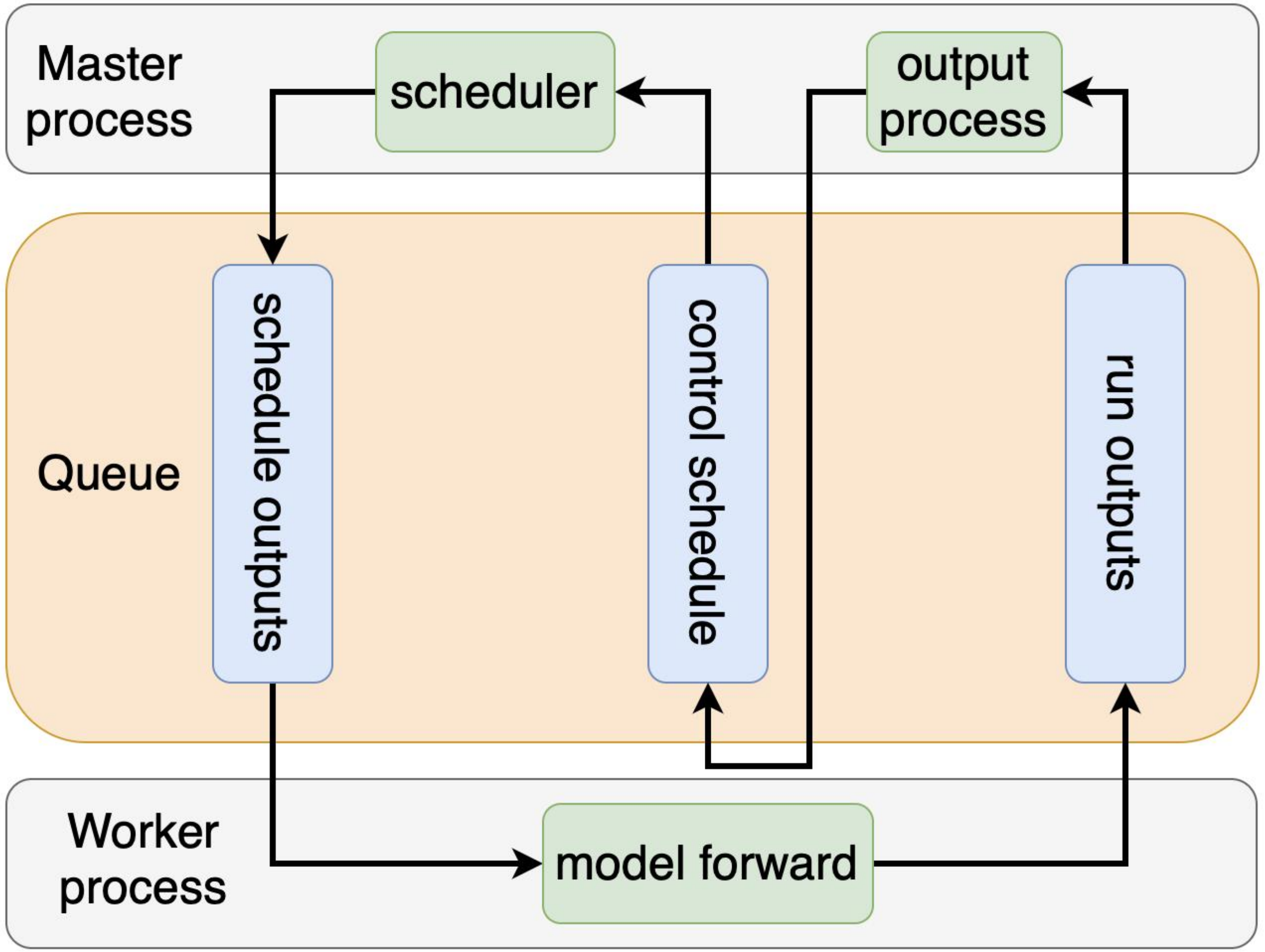
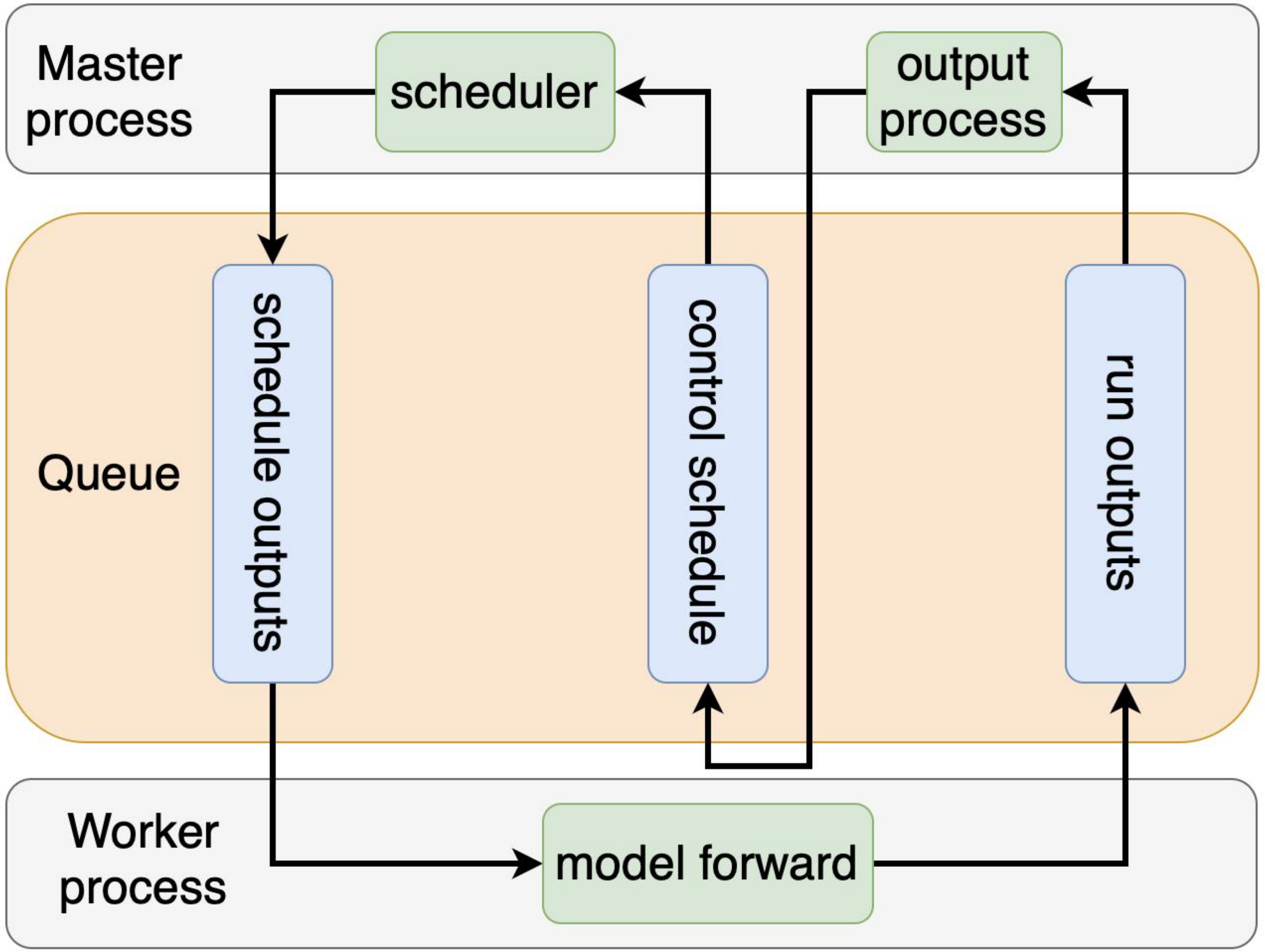


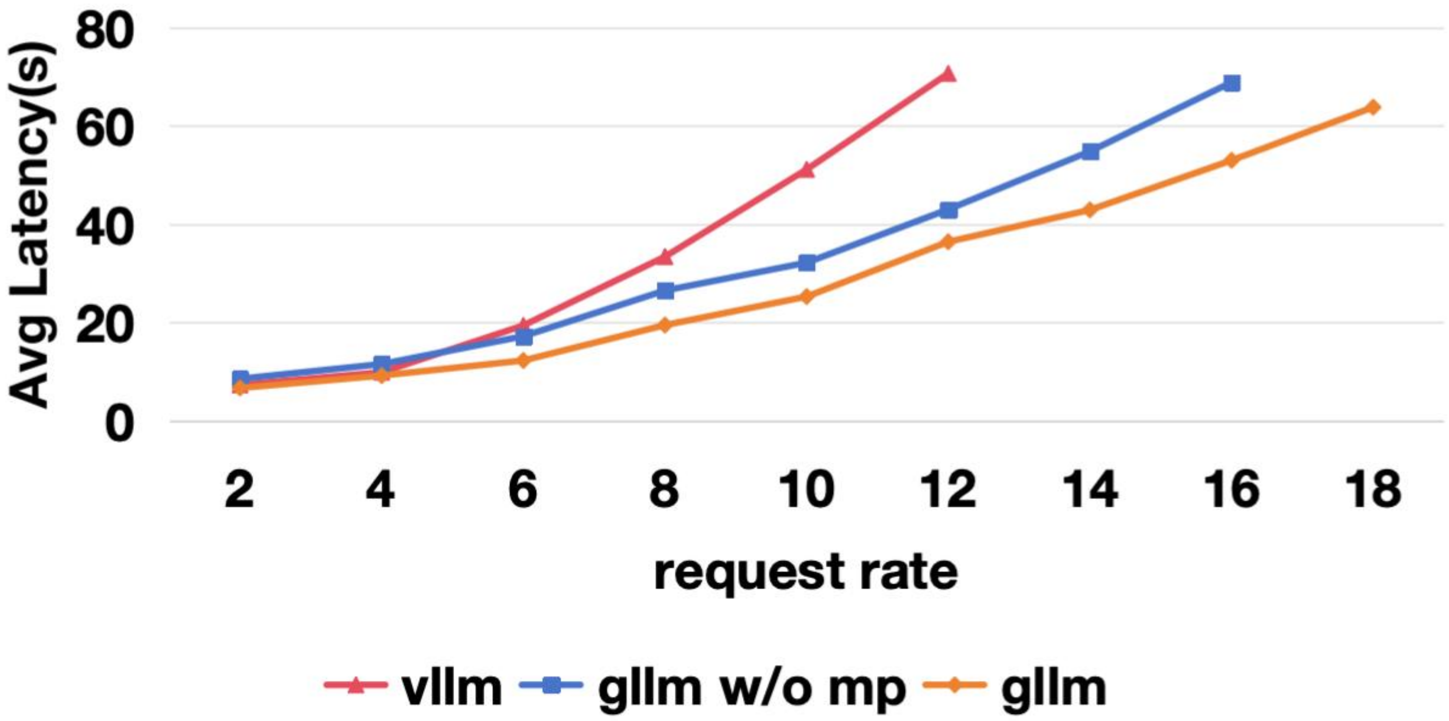
Multi-process

- □ Master process
  - ➢ Generate schedule outputs
  - ➢ Process model outputs
- □ Worker process
  - ➢ Generate model outputs
- □ Inter-process communication
  - ➢ Schedule outputs
  - ➢ Model outputs



Evaulated Result

- □ We implement pipeline schedule in gLLM
- □ We use shareGPT to benchmark online serving performance between vLLM, gLLM w/o pipeline schedule and gLLM on L20


Avg Latency(s)
request rate
vllm
gllm w/o mp
gllm