



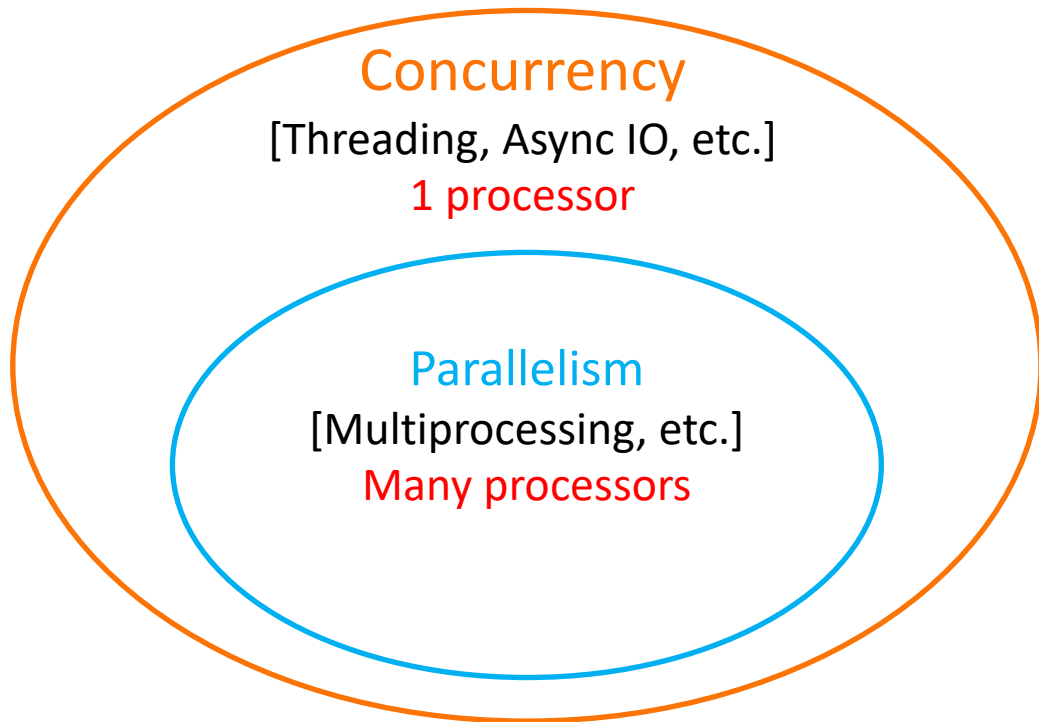
PEMROSESAN PARALEL

CCE60218



Parallelism & Concurrency

Parallelism & Concurrency



Parallelism & Concurrency

Orange: Running program.

Parallel



Task-3



Task-2



Task-1



Blue: The complete task (from start to finish).

Orange: Running program.

Concurrent



Task-3



Task-2



Task-1



Blue: The complete task (from start to finish).

Parallelism & Concurrency

NO	Concurrency	Parallelism
1.	Concurrency is the task of running and managing the multiple computations at the same time.	While parallelism is the task of running multiple computations simultaneously.
2.	Concurrency is achieved through the interleaving operation of processes on the central processing unit(CPU) or in other words by the context switching.	While it is achieved by through multiple central processing units(CPUs).
3.	Concurrency can be done by using a single processing unit.	While this can't be done by using a single processing unit. it needs multiple processing units.
4.	Concurrency increases the amount of work finished at a time.	While it improves the throughput and computational speed of the system.
5.	In concurrency debugging is very hard.	While in this debugging is also hard but simple than concurrency.



Parallelism & Concurrency

Concurrency Type	Switching Decision	# Processors
Pre-emptive multitasking (threading)	The operating system decides when to switch tasks external to Python.	1
Cooperative multitasking (asyncio)	The tasks decide when to give up control.	1
Multiprocessing (multiprocessing)	The processes all run at the same time on different processors.	Many



Threading

- Process: A process can be thought of as a program in execution.
- Thread: A thread is the unit of execution within a process. A process can have anywhere from just one thread to many threads.

Process



time



Asynchronous IO

- Async IO: A form of input/output processing that permits other processing to continue before the transmission has finished. Input and output (I/O) operations on a computer can be extremely slow compared to the processing of data.

Process

Thread 1



time



Multiprocessing

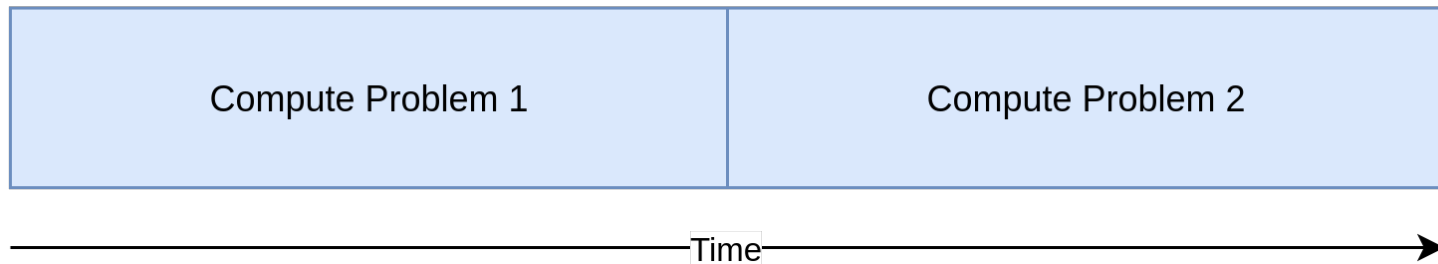
- Multiprocessing refers to the ability of a system to support more than one processor at the same time. Applications in a multiprocessing system are broken to smaller routines that run independently.



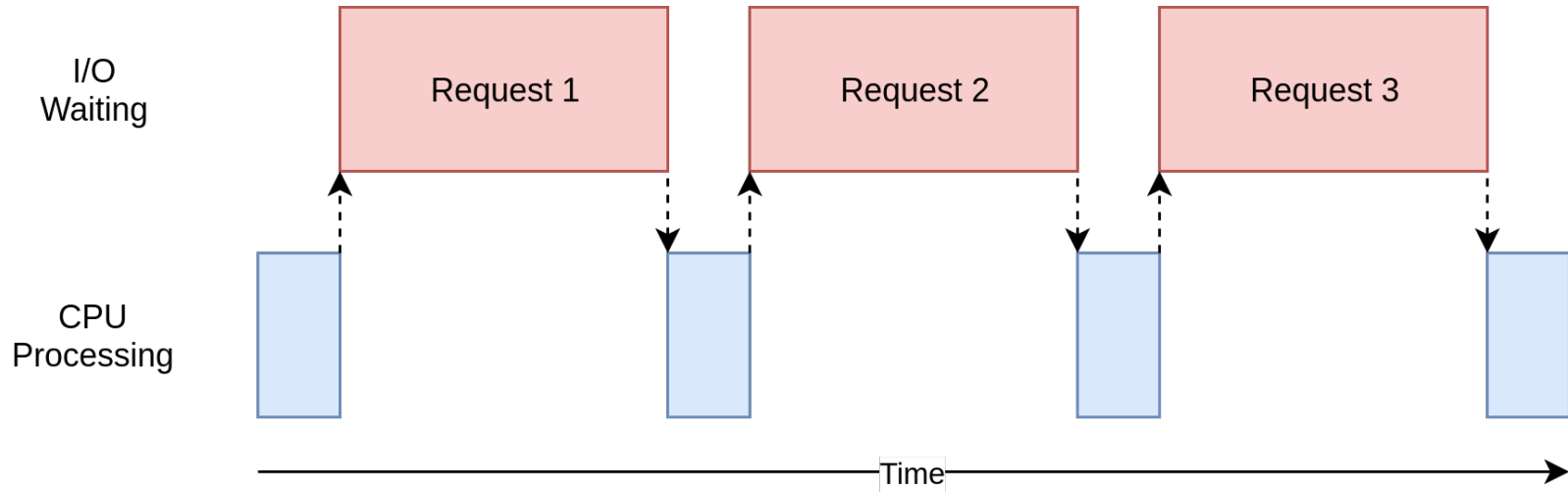
CPU-Bound Process

I/O
Waiting

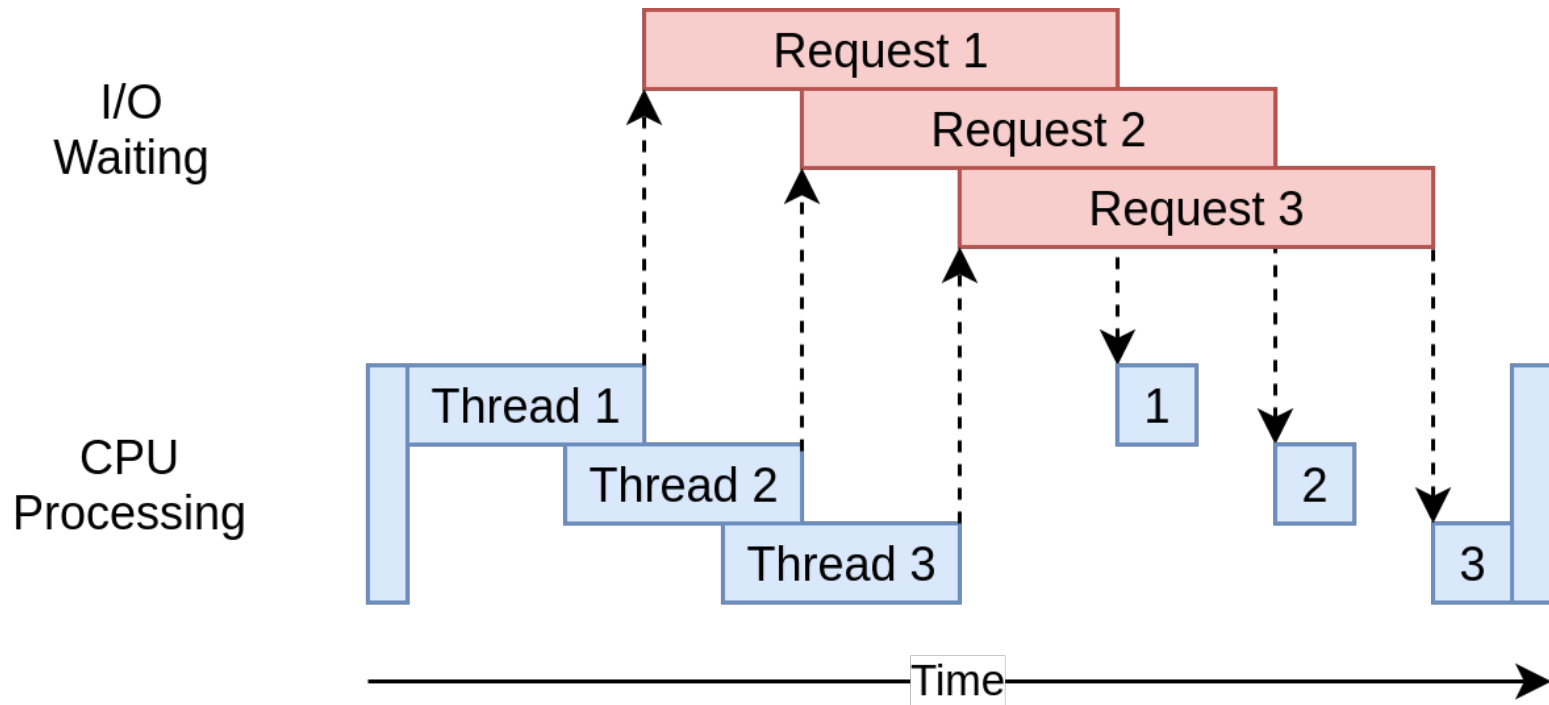
CPU
Processing



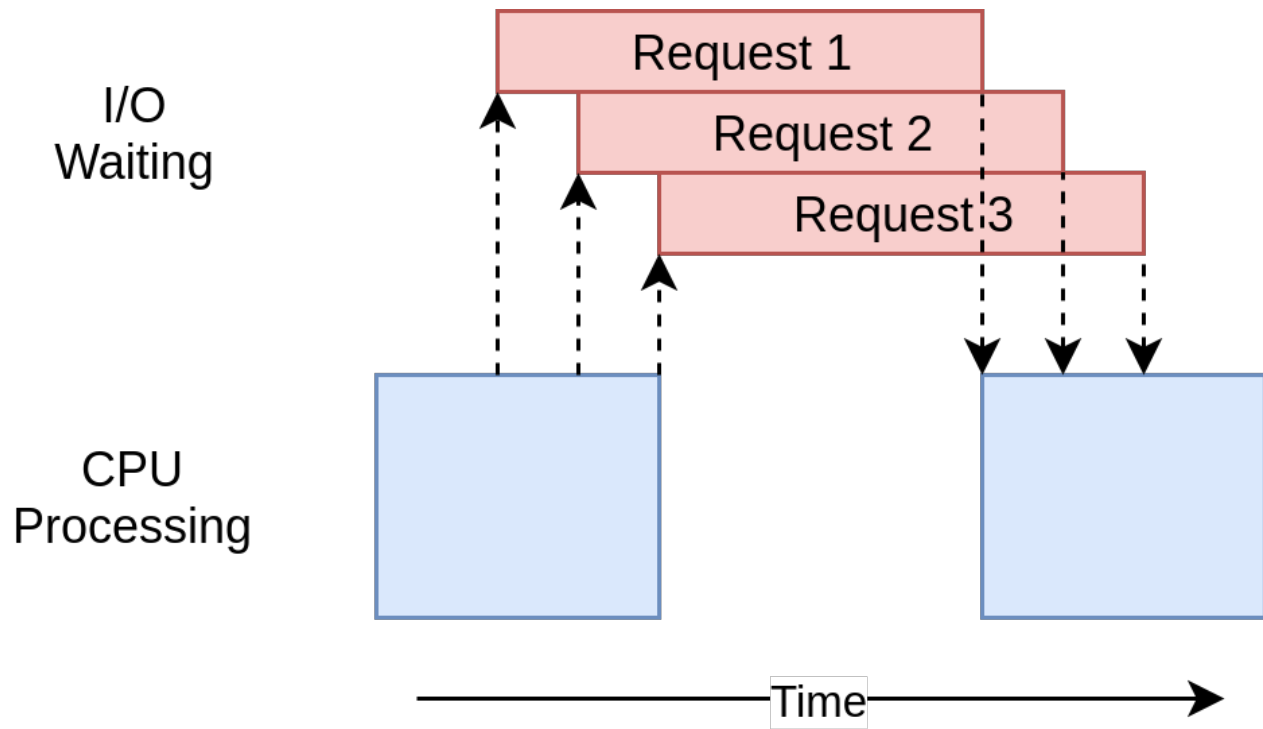
I/O-Bound Process



Multithreading



AsyncIO





Terima Kasih

