

Concurrency & Parallelism

Computing

Two words used interchangeably that mean different things.

**Concurrency is dealing with many things at once.
Parallelism is doing many things at once.**

Concurrent $\neq$ parallel · parallel implies concurrent

One core, ten tasks interleaved **Concurrent, not parallel**

Async I/O on a single thread.

Four cores, four computations

Parallel

Genuinely simultaneous.

Waiting on a network call **Concurrency helps; parallelism does not**

The CPU is idle either way.

THE COMMON MISTAKE

✗ **Adding threads to speed up I/O-bound work**

✓ **Use async, or a small pool**

The bottleneck is the network, not the CPU. More threads add context switching, not throughput.

Ask what the bottleneck is. CPU-bound work wants parallelism;
I/O-bound work wants concurrency.