

Memory Hierarchy

Computing

How far away each kind of storage is, in time the CPU can feel.

Approximate latencies, scaled so one CPU cycle is one second.

Level	Real time	If a cycle were 1s
Register	~0.3 ns	1 second
L1 cache	~1 ns	3 seconds
L2 cache	~4 ns	13 seconds
L3 cache	~15 ns	1 minute
RAM	~100 ns	5 minutes
SSD	~100 μ s	4 days
Network (same DC)	~500 μ s	3 weeks
Disk seek	~10 ms	1 year

Sequential access is far faster than random at every level. That is why arrays usually beat linked lists in practice.