

Operation	Nanoseconds	Milliseconds
L1 Cache Reference	1	
Branch Misprediction	3	
L2 Cache Reference	4	
Mutex Lock/Unlock	17	
Main Memory Reference	100	
Compress 1KB With Zippy	2,000	0.002
Read 1MB Sequentially From Memory	7,000	0.007
Send 2KB Over 1GBPS Network	16,000	0.016
SSD Random Read	123,000	0.123
Round Trip Within Same Datacenter	500,000	0.5
Read 1MB Bytes Sequentially From SSD	10,000,000	10
Read 1MB Bytes Sequentially From 1GBPS Network	10,000,000	10
Disk Seek	10,000,000	10
Send Packet CA ↔ Netherlands ↔ CA	150,000,000	150

1,000,000 Nanoseconds = 1 Millisecond

Latency Numbers