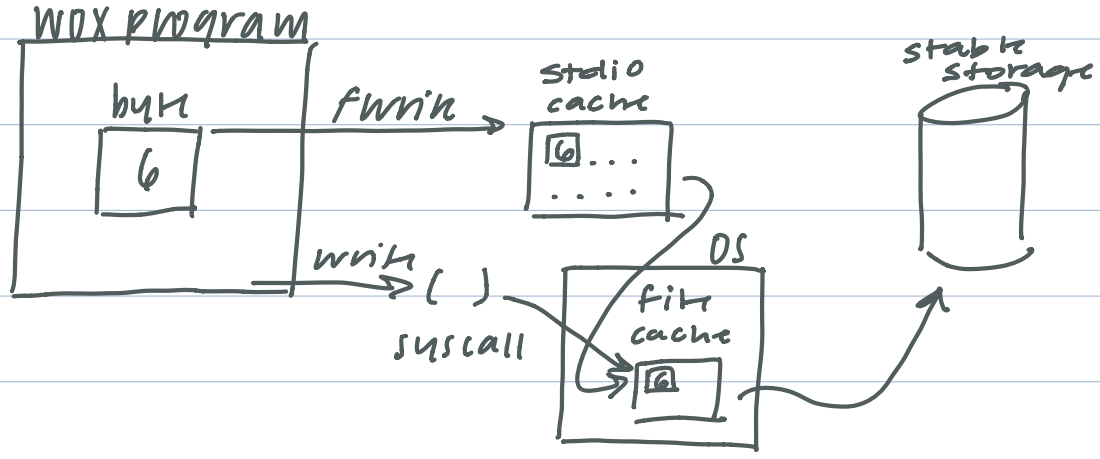
CS61 Lecture 17

October 29, 2019

Last Time (writing single byte)



Writing block of text: (512 byte write)

267 times faster

strace

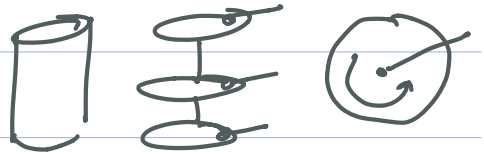
"snoop" on syscalls

Storage Devices

2 aspects of the performance of storage devices

1. latency = time to complete operation (lower is better)

   distance, technology effect



2. Throughput: # operations / second (bigger is better)

   disk: 5 ms average latency ~= 1 MB/sec ↑ throughput

   assumes repositioning head every time

   transfer rate ~ 140 MB/second

Disk is high latency, high throughput

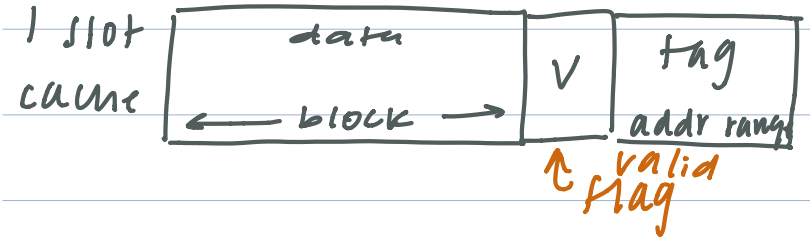
"10 Mph": may be faster to just put data on hard drive and drive it down 101

	main memory		hard disk		price / mb
2018	$0.0059	(29.5x)	$0.000020	(1)	
2003	$0.09	(4100x)	$0.00132	(6.6x)	
1990	$148.20	(7.4Mx)	$5.45	(270k x)	
~1995	$411M	(20,500,000,000x)	$6,250		

↑ Moore's law and silicon, manufacturing

How does a cache work?

Single Slot



request address

↓

```
if (V) {
  if (reqaddr in $addr range) {
    yes → hit!
      return data
  }
  else {
    no → miss
  }
}
```

Multi-slot cache

	data	V	tag
0	data	V	tag
1	data	V	tag
2	data	V	tag
3	data	V	tag

$C[i] = A[i] + B[i]$

request addr

fully-associative cache: any member of any addr into any slot of cache

direct mapped: each request addr can only appear in one slot

- in a process, virtual addr
- in hardware, physical addr