#### CS341 #34 - Disks & Signals

## > Solid State Drives/Solid State Disks (SSD)s

NAND Flash. Use quantum tunneling through an insulator to write/erase! Limited number of erasures. No moving parts.

Requires separate controller:

Error-correcting code (ECC), Bad block mapping

Block erasing, Wear leveling

Read and write caching, Garbage collection, Encryption

Very fast random access & throughput. Can be limited by bus speeds. e.g. SATAIII speeds 6Gbit/s (600MB/s bus)

Benchmarks measure 'IOPs'

SLC (Single bit per cell); 100K writes per cell MLC Multilevel cell (2bits); 10K writes per cell

TLC Triple level (3bits per cell); 3-5K writes per cell, now QLC...

### > Spinning disks

Cylinders. Platters. Heads.

Two common rotational speeds 5400 & 7200rpm.

7200rpm = \_\_\_\_\_ revolutions per

second

How many milliseconds for one revolution?

Access time?

Average seek time  $\sim 10 \text{ms}$  (but seeking to next track  $\sim 1 \text{ms}$ ).

Average rotational latency.

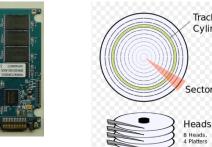
Tiny contributions:

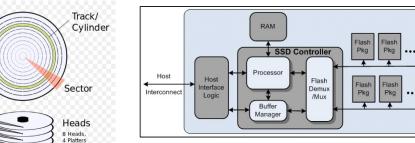
Command processing time (0.003ms)

Head settling time (0.1ms)

IOPs?

Image attrib:/www.usenix.org/legacy/event/usenix08/tech/full papers/agrawal/agrawal html/index.html





# > Signals

For more information man -s7 signal

#### Can signals be queued?

Signal terminology.

Generated

Pending

Blocked

Delivered

Caught

Spindle

Platters

Head

Actuator

Disposition

Signal disposition per thread or per process?

Signal disposition after fork?

... after exec?

### What is signal masking?

When would I use sigprocmask?

When would I use pthread sigmask?

So which thread will get the signal?

### What are Pending signals?

From man -s7 signal

"A child created via fork(2) initially has an empty pending signal set; the pending signal set is preserved across an execve(2)."

## Sending signals? pthread\_kill raise kill

```
Catching signals ?
sigwait
signalfd
signal
sigaction
```

Demo: Write a program that demonstrates sigprocmask to block and then unblock a signal.

# What's wrong with signal?

```
How do I use sigaction ?
int sigaction(int sig, struct sigaction *act, struct sigaction *oldact);
struct sigaction {
        void (*sa_handler)(int);
        void (*sa_sigaction)(int, siginfo_t *, void *);
        sigset_t sa_mask;
        int sa_flags;
};
```

```
struct sigaction sa;
sa.sa_handler = handler;
sigemptyset(&sa.sa_mask); //Also sigfillset
sa.sa_flags = SA_RESTART;
/* ^^ Restart functions if interrupted by handler */
sigaction(SIGINT, &sa, NULL)
```

```
How do we complete and fix this code to catch SIGCHILD?

(hint: WNOHANG and a while loop will be useful here)

int dezombify(int signal) {
  int status;
  pid_t child;
  child = waitpid(-1, &status, _____);

}

struct sigaction sa;
sa.sa_handler = ____;
sig_____(___);
sa.sa_flags = ____;
sigaction(_____, &sa, NULL)
```

What happens to the new thread during *pthread\_create* to *pending* signals and the thread's signal mask?