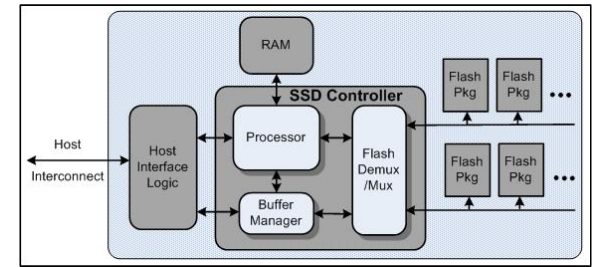
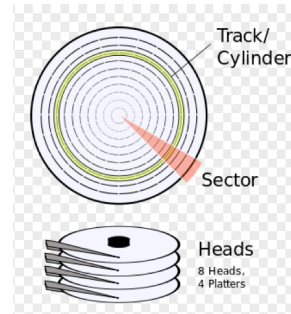


## > Solid State Drives/Solid State Disks (SSD)s

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); consumer grade; 3-5K writes per cell

## > Spinning disks

Cylinders. Platters. Heads.

Two common rotational speeds  
5400 & 7200rpm.  
7200rpm = \_\_\_\_\_ revolutions per second

How many milliseconds for one revolution ? \_\_\_\_\_

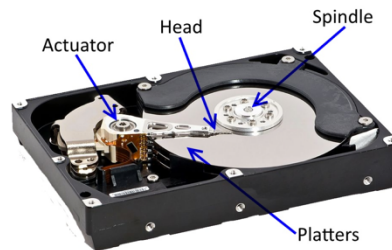
Access time?

Average seek time ~ 10ms (but seeking to next track ~ 1ms).  
Average rotational latency.

Tiny contributions:

Command processing time (0.003ms)  
Head settling time (0.1ms)

IOPs?



## > Signals

For more information man -s7 signal

### Can signals be queued?

Signal terminology.

Generated

Pending

Blocked

Delivered

Caught

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 SIGCHLD ?  
(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)
```

How do I set a threads mask? Why would I want to?

```
int pthread_sigmask(int how, sigset_t *set,
                    sigset_t *oldset);
```

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