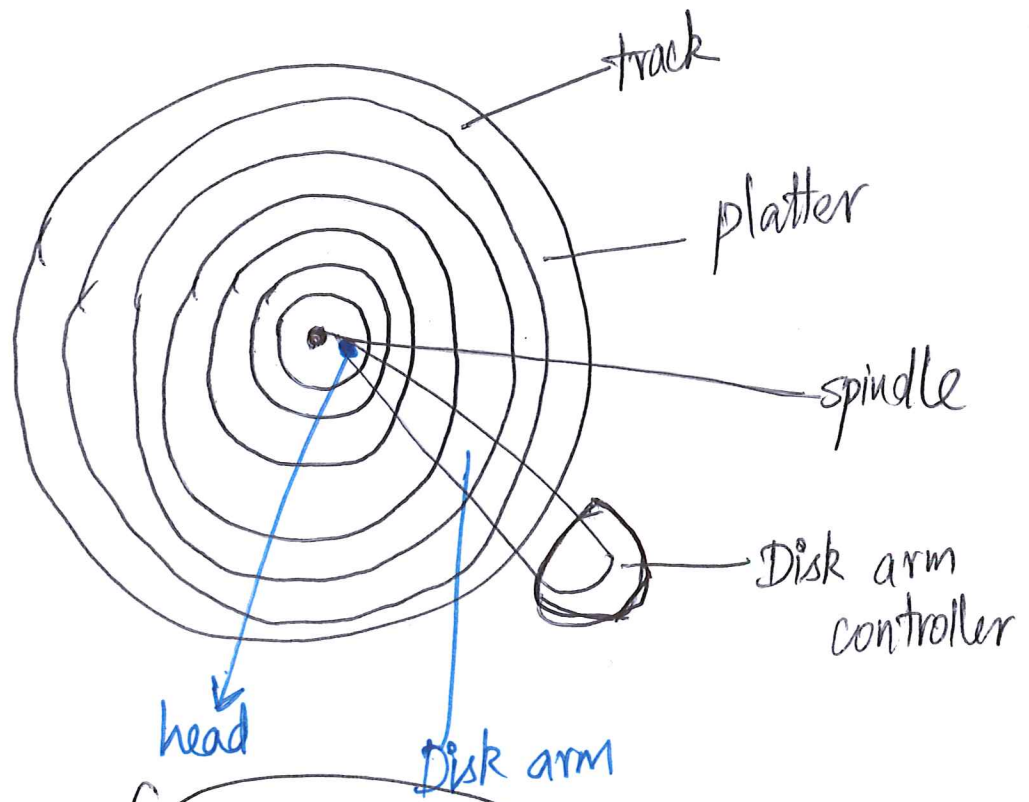
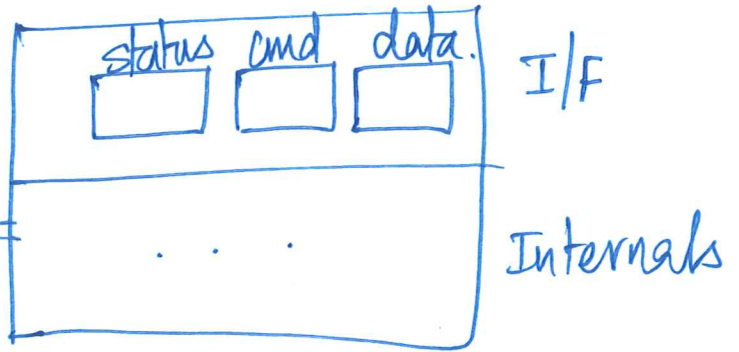


Disks!

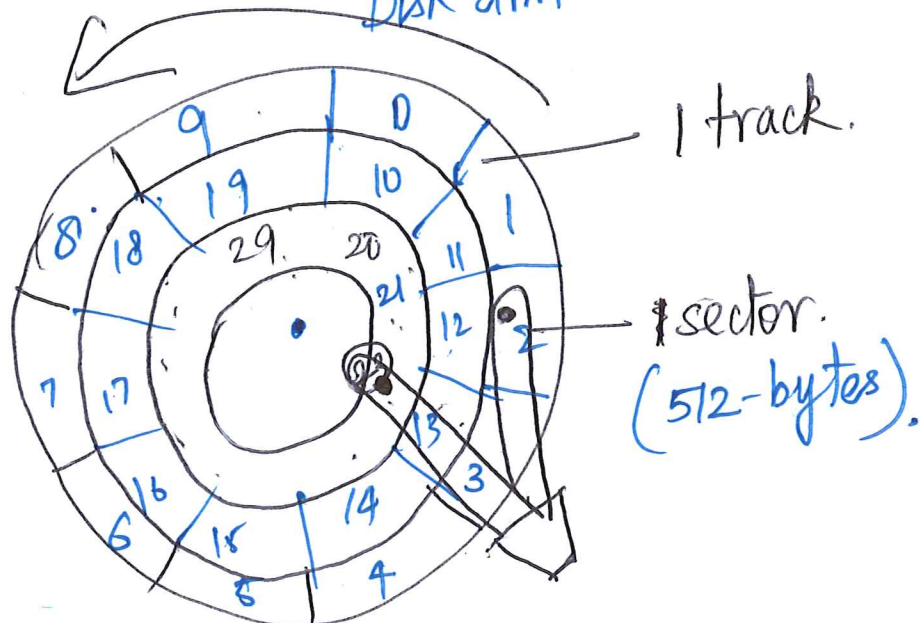
Last week

→ I/O devices

→ polling vs interrupts



- 1. seek
- 2. rotation
- 3. transfer



$$T_{I/O} = T_{\text{seek}} + T_{\text{rotation}} + T_{\text{transfer}}$$

(ms) (ms) (μs)

Workloads

Sectors: 3, 21, 17, 2, 11 (Random)

Sectors: 12, 13, 14, 15, 16, 17 (Sequential)

$$R_{I/O} = \frac{\text{Size Transfer}}{T_{I/O}}$$

	Cheetah 15K.5	Barracuda
Capacity	300 GB	1 TB
<u>RPM</u>	15,000	7,200
Avg. Seek.	<u>4 ms</u>	9 ms
Max. transfer Rate	125 MB/s	105 MB/s.

Cheetah

$$T_{I/O} = T_{seek} + T_{rot} + T_{transf.}$$

① Random
size = 4KB (small).
multiple small reads.

$$T_{seek} = 4 \text{ ms.} \quad \checkmark$$

(Avg) $T_{rot} = 2 \text{ ms}$

$$T_{transfer} = 31 \mu\text{s}$$

$$15,000 \text{ rotations} \rightarrow 1 \text{ min (60 s)}$$

$$1 \text{ rot} \rightarrow \frac{60 \text{ s}}{15,000}$$

$$\Rightarrow \underline{4 \text{ ms}} \quad (\text{full rot time})$$

$$T_{I/O} = 4 \text{ ms} + 2 \text{ ms} + 31 \mu\text{s}$$

$$= \underline{\underline{6.031 \text{ ms}}}$$

$$\approx \underline{\underline{6 \text{ ms}}}$$

$$R_{I/O} = \frac{4 \text{ KB}}{6 \text{ ms}} = \boxed{0.66 \text{ MB/s}}$$

$$125 \text{ MB} \rightarrow 1 \text{ s}$$

$$4 \text{ KB} \rightarrow \underline{4 \text{ KB}}$$

$$\Rightarrow \frac{125 \text{ MB}}{4000} \quad 31$$

$$\approx \frac{125 \times 10^6}{31}$$

125

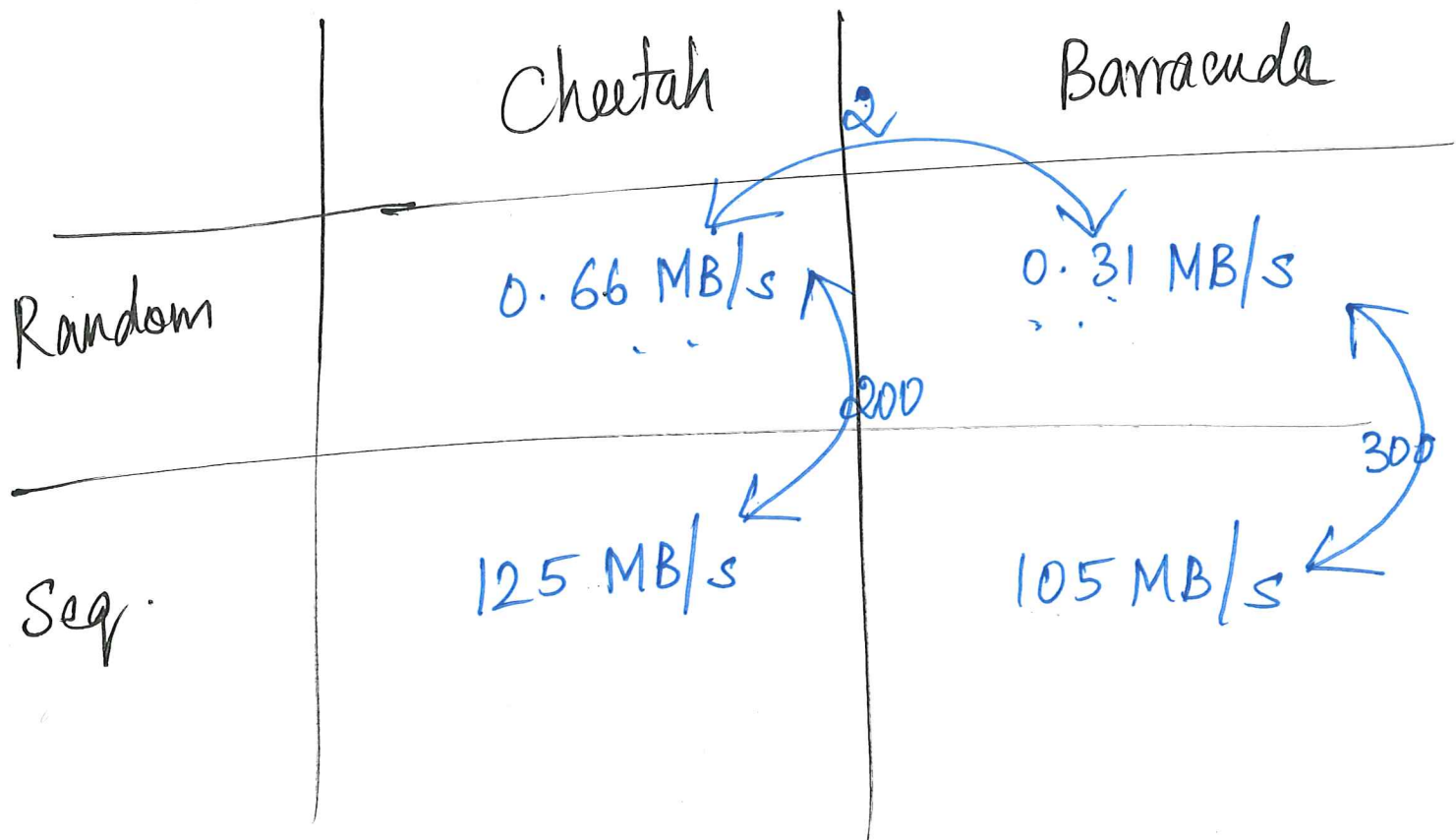
② Sequential

$$\text{Size} = \underline{100 \text{ MB}}$$

$$\text{Max } R_{I/O} : \underline{125 \text{ MB/s.}}$$

$$T_{I/O} = \frac{\frac{100 \text{ MB}}{5}}{\frac{125 \text{ MB/s}}{5}} = 0.8 \text{ s}$$

800 ms



$$T_{I/O} \text{ Seq Barracuda} = \frac{100 \text{ MB}}{105 \text{ MB/s}} = \underline{950 \text{ ms}}$$

