

2721

Lesson 7

-1-

Hard disk drives



not optical drives



Homework: Read

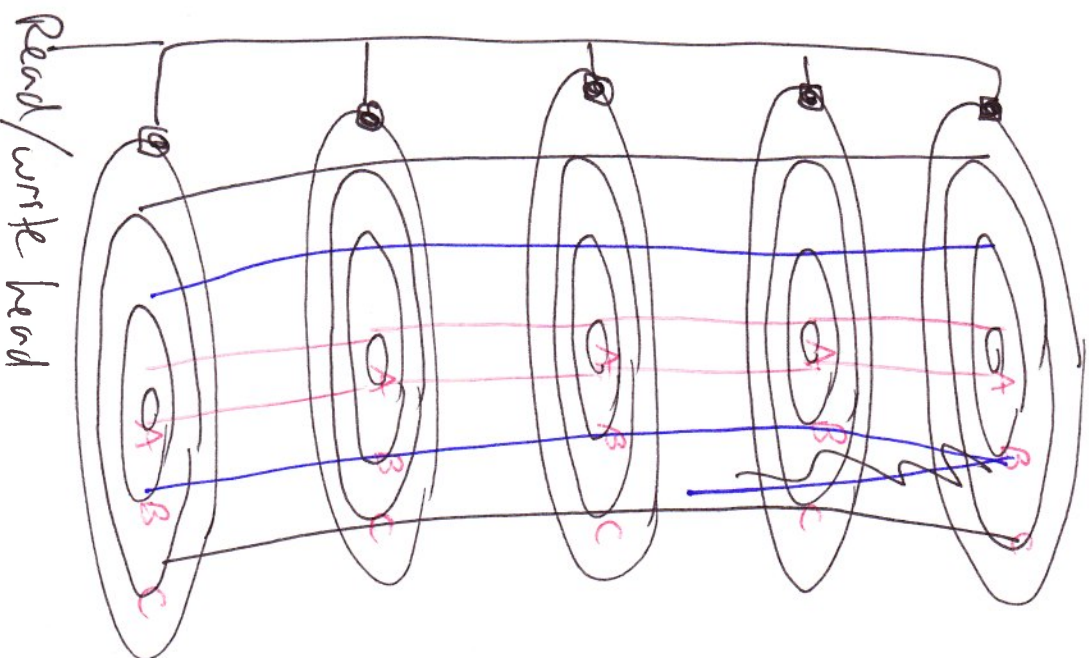
Solid-state drives

Single sided platters

Track: one ring of magnetic bits a fixed radial distance from the center.

Cylinders: the same track on each platter

eg the A cylinder B cylinder C cylinder



1 hard drive

5 single-sided platters/discs

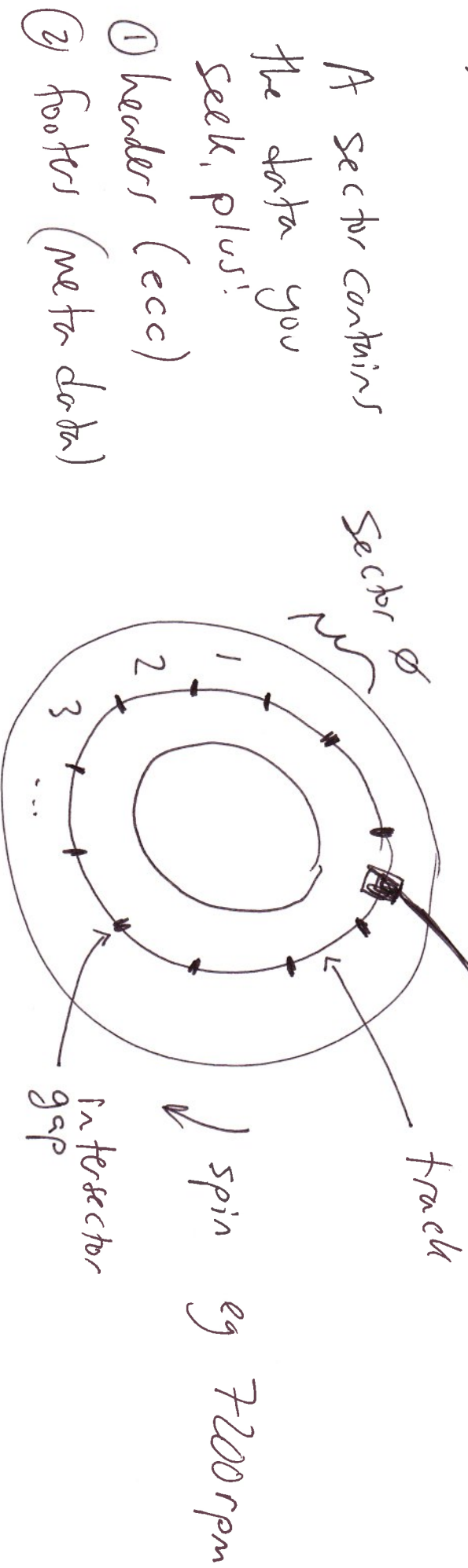
3 tracks

A B C

To read a hdd:

- ① Move the RW head to the track you want.
SEEK TIME
 - ② Wait for the sector you want, to rotate under the RW head.
ROTATIONAL LATENCY
- } on average, wait half a cycle.

A track is made of sectors:



eg

5400 RPM \rightarrow

90 rps \rightarrow

$\frac{1}{90}$ spr \rightarrow ~~11.1~~ ms

-3-

7200 RPM \rightarrow

120 rps \rightarrow

$\frac{1}{120}$ sec per rev \rightarrow 8.3 ms

10800 RPM \rightarrow

180 rps \rightarrow

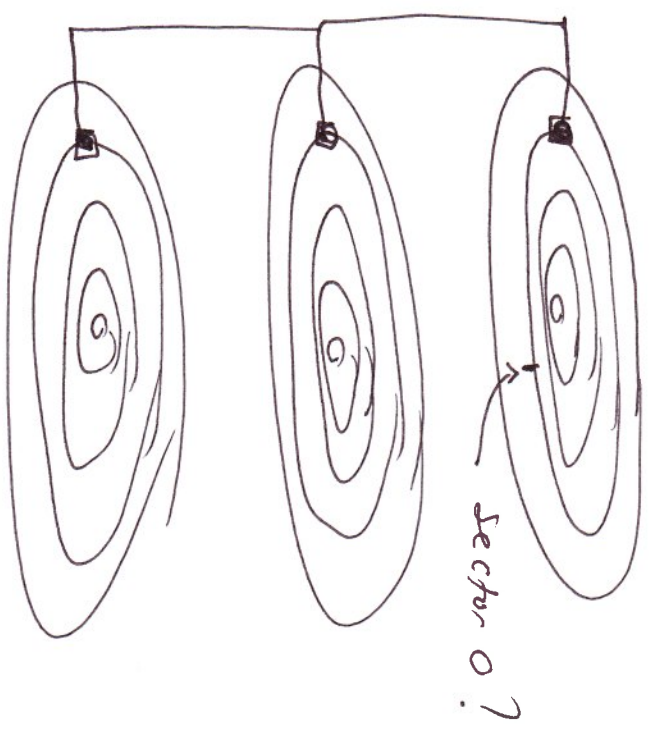
$\frac{1}{180}$ sec per rev \rightarrow 5.5 ms

6000 RPM \rightarrow 10 msec/rev

Remember

To read ~~entire~~ HDD: from the very first sector of an entire HDD: from the very first platter to the very first track on the very first platter: the last sector of the last track of the last platter:

- ① Locate the first track with RW head
"average case seek time"
- ② wait for sector zero
"half a cycle"
- ③ Read that track: all its sectors "one rotation"
- ④ Read the same track for all platters in that same cylinder "two rotations for"
- ⑤ Move to next track
"one rotation: it took time to move and sector 0 is gone"



⑥ Repeat steps 2-5 for each track.

20 page 144

1. Seek #1 takes

$$\frac{20ms + 0ms}{2} = 10ms \text{ on avg.}$$

2. Wait for sector 0:

5msec on avg

3. Read that track! leg 4

10msec

4. Read three more tracks

30msec

5. Seek next track

1ms

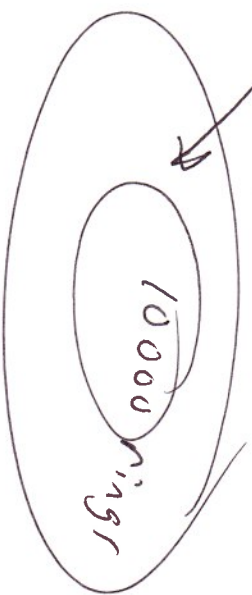
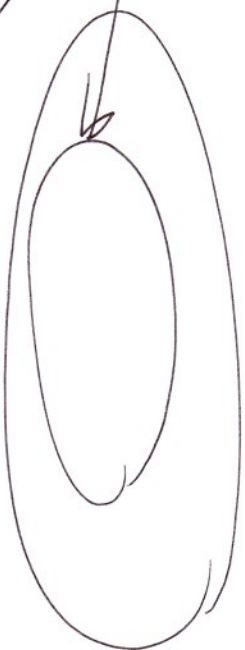
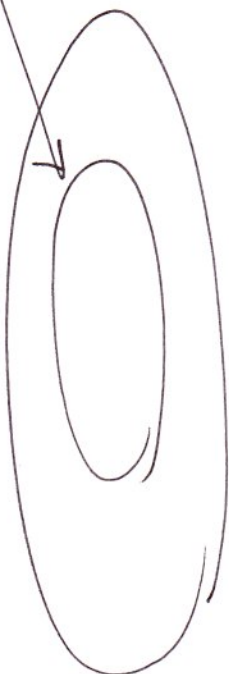
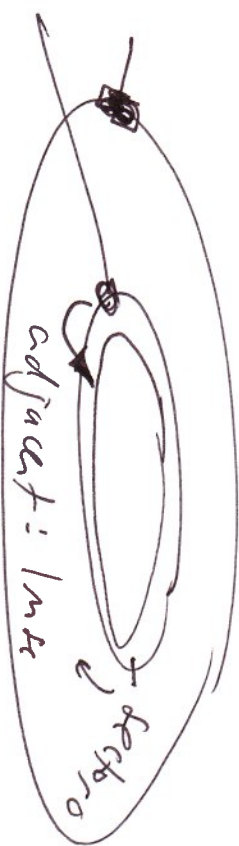
Wait 9ms for sector 0 to come back

Repeat steps 3-5: 9999 times

$$= 50msec \cdot 10000 \text{ times} + 50ms + 5ms$$

6000 RPM

$$\frac{10ms}{-5} = -5$$



$$500015 \text{ msec} = 500.015 \text{ sec}$$