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CS 143 : Homework #3

① Disk capacity

(a) $\left(\frac{6 \text{ surfaces}}{\text{disk}}\right)\left(\frac{10000 \text{ tracks}}{\text{surface}}\right)\left(\frac{500 \text{ sectors}}{\text{track}}\right)\left(\frac{1024 \text{ bytes}}{\text{sector}}\right) \Rightarrow$ **30 GB / disk**

(b) Avg. Time To Read a random sect.

10 ms [seek time] + 5 ms [rot. delay] + 0.02 ms [transfer time] ⇒ **15.02 ms**

(c) How many disk blocks?

$\left(\frac{1024 \text{ bytes}}{\text{block}}\right)\left(\frac{1 \text{ tuple}}{72 \text{ bytes}}\right) = \left(\frac{14 \text{ tuples}}{\text{block}}\right) \Rightarrow \left(\frac{1000 \text{ tuple}}{1}\right)\left(\frac{\text{block}}{14 \text{ tuple}}\right) =$ **72 blocks**

(d) Time to run query?

10 ms [seek time] + 5 ms [rot. delay] + 72(0.02 ms) [transfer time] ⇒ **16.4 ms**

(e) Time to run query?

24(10 ms) [seek time] + 5 ms [rot. delay] + 3(0.02 ms) [transfer time] ⇒ **361.4 ms**

(f) Time to run query. Is it helpful to create B+ tree to run query?

15.024 ms where t = # of cluster matching query (i.e. 2005)

- As we are no longer using cluster ⇒ we need t random IOs to get t tuples (or we are cached in main)
- Thus, if blocks are sequentially stored ⇒ indexing would slow down execution