

Homework- 5 Solutions

软件 2101 杨豪 学号: 2206213297

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Honor Code: I promise that I finished the homework solutions on my own without copying other people's work.

6.3

a.

$$\text{capacity} = 8 \times 256 \times 32 \times 1 \text{ KB} = 2^{16} \text{ KB} = \mathbf{64 \text{ MB}}$$

b.

$$\begin{aligned} T_a &= T_s + \frac{1}{2r} + \frac{b}{rN} + \text{track-to-track access time} \\ &= 8 \text{ ms} + \frac{1}{2 \times \frac{3000 \text{ rpm}}{60 \text{ spm}}} + \frac{b}{\frac{3000 \text{ rpm}}{60 \text{ spm}} \times 32 \text{ KB}} + \left(\left\lceil \frac{b}{32 \text{ KB}} \right\rceil - 1 \right) \times 1.5 \text{ ms} \\ &= 18 + 0.625b + 1.5 \left(\left\lceil \frac{b}{32} \right\rceil - 1 \right) (\text{ms}), \text{ } b \text{ is number of KB to be transferred.} \end{aligned}$$

c.

$$\begin{aligned} T &= \frac{b}{rN} + \text{track-to-track access time} \\ &= \frac{2.5 \text{ MB}}{\frac{3000 \text{ rpm}}{60 \text{ spm}} \times 32 \text{ KB}} + \left(\left\lceil \frac{2.5 \text{ MB}}{32 \text{ KB}} \right\rceil - 1 \right) \times 1.5 \text{ ms} \\ &= 1600 + 118.5 = 1718.5 \text{ ms.} \end{aligned}$$

d.

$$\text{rate} = rN = \frac{3000 \text{ rpm}}{60 \text{ spm}} \times 2^5 \text{ KB} \approx 1.56 \text{ MB/s}$$

6.10

a.

$$\left\lceil \frac{1000}{500} \right\rceil \times 150 = \$300$$

b.

$$\left\lceil \frac{1000}{400} \right\rceil \times 50 + 2500 = \$2650$$

c.

$$\left\lceil \frac{x}{400} \right\rceil \times 50 + 2500 < \left\lceil \frac{x}{500} \right\rceil \times 150 \implies x > 14000 \text{ GB}$$

d.

bigger data capacity requirement and slower speed requirement.

Other things

- L^AT_EX code refer to these things and was compiled on texlive2020.
 - [UCB-CS70's given homework template.](#)
 - [A free website useful to edit L^AT_EX formula code.](#)
- Some context refer to Professor Li. 's PPT.

Thanks for your correcting and grading :).