

計結 CH5

107061218 謝霖泳

1. (1) block size = 2^{12} (byte) = 4 (KB).

(2) # of block = $2^{10} = 1024$

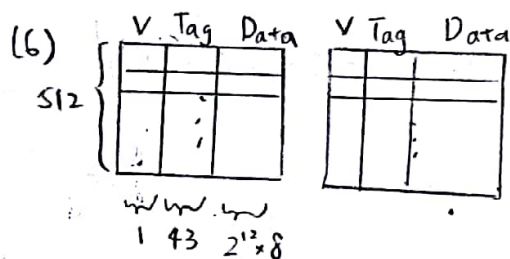
(3) 4KB \times 1024 = 4096 (KB).

(4) $(2^{12} \times 8 + \underbrace{42}_{\text{valid}} + \underbrace{1+1}_{\text{dirty}}) \times \frac{1}{8} \times 1024 = 4199936$ (byte) =

(5) miss, hit, hit, miss, miss,

miss, miss, hit, hit, hit,

miss, miss, hit, miss, hit



valid bit dirty bit

$\left[(2^{12} \times 8 + 43 + 1 + 1) \times \frac{1}{8} \times 512 \right] \times 2$
 = 4200064 (byte).

(7) miss, hit, hit, miss, miss,

miss, hit, hit, hit, hit,

miss, hit, hit, hit, hit

2.

(1) CPI = 2 \Rightarrow IPC = $\frac{1}{2} = 0.5$

read bandwidth = $\left(\begin{aligned} &0.5 \times 3\% \times 64 \Rightarrow \text{miss in I-cache} \\ &+ 0.5 \times \frac{250}{1000} \times 2\% \times 64 \Rightarrow \text{read miss in D-cache} \\ &+ 0.5 \times \frac{100}{1000} \times 2\% \times 64 \Rightarrow \text{write miss in D-cache} \end{aligned} \right)$
 = 0.32 (bytes/cycle)

$$(2) \text{ write bandwidth} = 0.5 \times \frac{100}{1000} \times 4 = 0.2 \text{ (bytes/cycle)}$$

3.

$$(1) 1.5 + \frac{7}{100} \times 200 = 15.5$$

$$(2) 1.5 + \frac{7}{100} \times 12 + \frac{7}{100} \times \frac{3.5}{100} \times 200 = 2.83$$

$$(3) 1.5 + \frac{7}{100} \times 28 + \frac{7}{100} \times \frac{1.5}{100} \times 200 = 3.67$$

$$(4) 1.5 + \frac{7}{100} \times 12 + \frac{7}{100} \times \frac{3.5}{100} \times 50 + \frac{7}{100} \times \frac{3.5}{100} \times \frac{1.3}{100} \times 200 = 2.46887$$

$$(5) 1.5 + \frac{7}{100} \times 28 + \frac{7}{100} \times \frac{1.5}{100} \times 50 + \frac{7}{100} \times \frac{1.5}{100} \times \frac{1.3}{100} \times 200 = 3.51523$$

5.

$$(1) (2^{19} \times 4) \times 5 = 10485760 \text{ (byte)} = 10.5 \text{ (MB)}$$

$$(2) \# \text{ of P2 needed} = \left\lceil \frac{100 \text{ MB}}{2^{24}} \right\rceil = 7$$

$$\text{size of P2 table} = (2^{11} \times 4) \times 7 = 56 \text{ (KB)}$$

$$\text{size of P1 table} = 4 \times 2^8 = 1 \text{ (KB)}$$

$$\text{total size} = (56 + 1) \times 5 = 285 \text{ (KB)}$$