database : 6 000 000 Pages

(a)

5 ↑ buffer ⟹ 5-way external merge sort.

Answer :

$$\text{pass num} = 1 + \left\lceil \log_{B-1}\left(\left\lceil \frac{N}{B} \right\rceil\right) \right\rceil$$

$$= 1 + \log_4 1200000$$

$$= 1 + 11 = 12$$

(b)

Answer :

$$2N \times \text{pass num} = 2 \times 6000000 \times 12$$

$$= 144000000$$

(c)

等价于 $N \le B(B-1)$

取 min B $= 2450$

$2450 \times 2449 = 6000050 > N$

Answer : 2450

(d)

Answer : pass num = 4

$$B \cdot (B-1) \cdot (B-1) \cdot (B-1) \geq N$$

$$\min B = 51$$

(e)

pass num = 5.

Answer :

$$B \cdot (B-1)^4 = 10 \cdot 9^4 = 65610$$

$$N \leq 65610$$

$$\max N = 65610$$