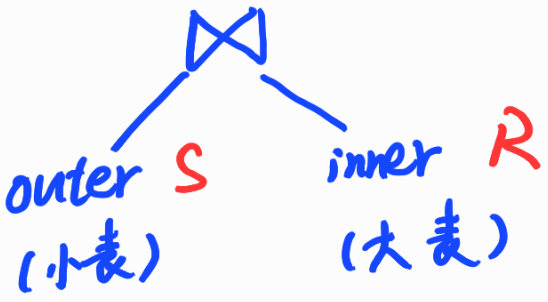
Table: R: 1800 pages (M) 100 tuples each

S: 600 pages (N) 60 tuples each

Buffer has 36 pages (B)

(a) i)

Hash Join



哈希分区的 IO cost = $2 \cdot (M+N) = 4800$

ii)

哈希探测 IO cost = $M+N = 2400$

(b) Block nested loop Join

以 R 表作 outer

S 表作 inner

B-2 个 Buffer page 存 outer T

1 个 存 inner T

1 个 有 输出

(outer table) (inner table)

$$IO\ cost = M + \left(\left\lceil \frac{M}{B-2} \right\rceil \times N\right)$$

$$= 1800 + \left(\left\lceil \frac{1800}{34} \right\rceil \times 600\right)$$

$$= 33600$$

(c) 以 S 表作 outer T

R 表作 inner T

$$IO\ cost = 600 + \left(\left\lceil \frac{600}{34} \right\rceil \times 1800\right)$$

$$= 33000$$

(d) Sort merge Join

以 S 作 outer T

R 作 inner T

(i)

inner Table R

Sort cost for

$$\text{passes} = 1 + \lceil \log_{B-1} \lceil \frac{R.\text{pages}}{B} \rceil \rceil$$

$$= 1 + \lceil \log_{35} \frac{1800}{36} \rceil$$

$$\text{cost} = 2\, R.\text{pages} \cdot \text{passes}$$

$$= 2 \cdot 1800 \cdot 3 = 10800$$

(ii) Sort cost for outer Table S

$$\text{cost} = 2 \cdot S.\text{pages} \cdot (1 + \lceil \log_{B-1} \lceil \frac{S.\text{pages}}{B} \rceil \rceil)$$

$$= 2 \cdot 600 \cdot (1 + \log_{35} \frac{600}{36})$$

$$= 2 \cdot 600 \cdot 2 = 2400$$

(iii) Merge cost

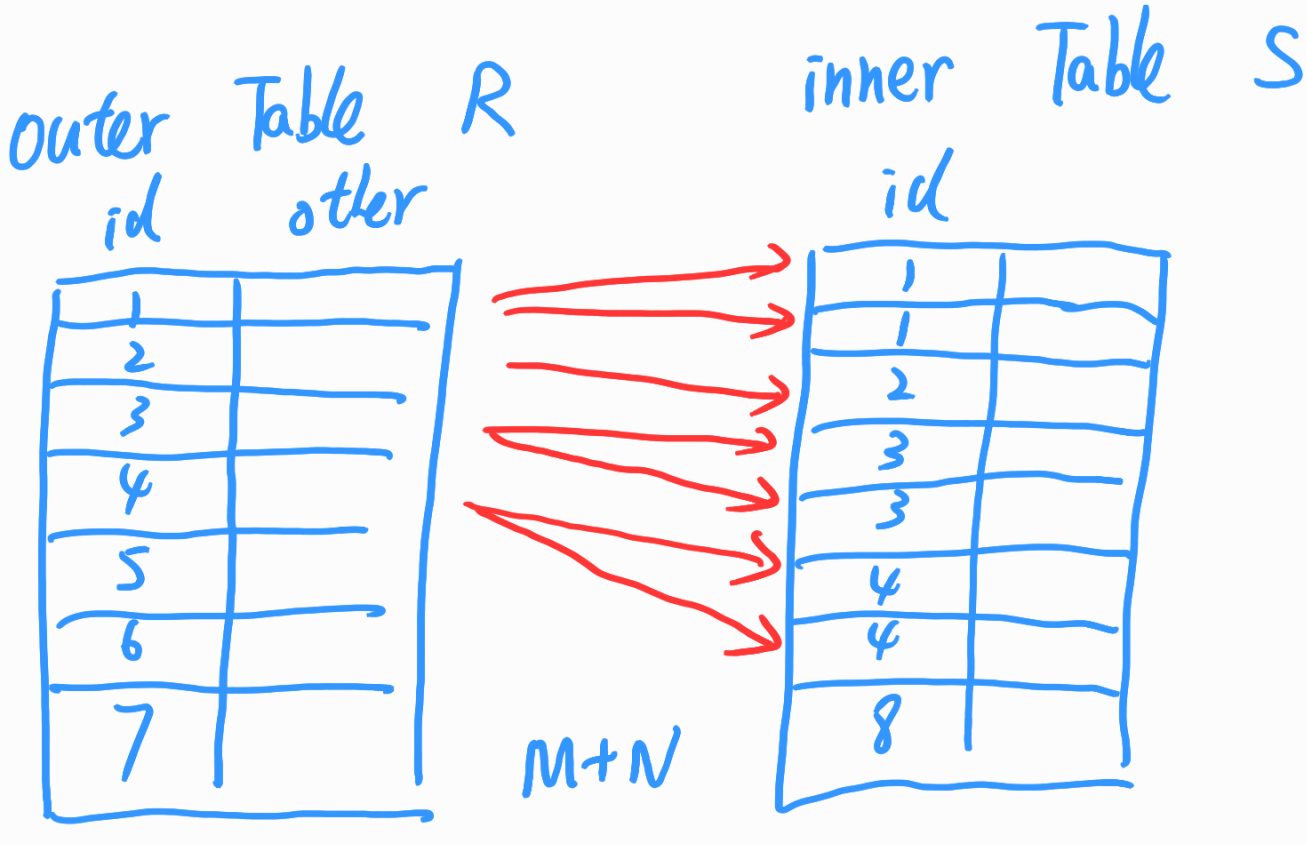
$$\text{cost} = M + N = 2400$$

(iv) Worst scenario Merge sort

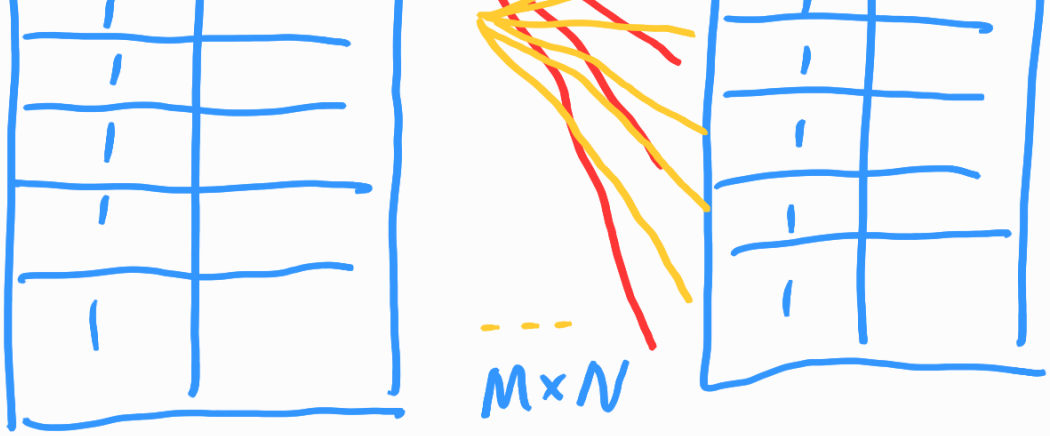
最差时，退化为 $M \cdot N$

（2表值为同一单一值）

Cost = $M \cdot N = 1080000$



worst scenario


M×N