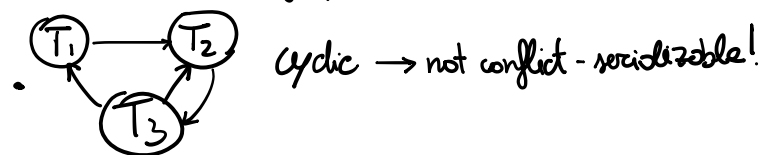


1) Build Precedence graph.



• $sl_1(x) r_1(x) sl_3(T) sl_3(y) r_3(T) r_3(y) xl_1(y) u_1(x) xl_2(x) w_2(x) w_1(y) sl_3(z) r_3(z) \dots$

at this point T_2 and T_3 block each other to take lock on x and $z \rightarrow$ Not 2PL

• Not ACID course $r_3(x)$ reads from $w_2(x)$ and T_2 has not committed already

• Is 2PL course in this case T_2 can lock z and continue.

2) "Accepted by timestamp based scheduler" means that exists a serial schedule based on timestamps that is conflict equivalent \rightarrow conflict serializable \Rightarrow view-serializable.

3) $3,000,000$ t of 4 in $150,000$ p $\rightarrow 20$ t of 4 per p $\rightarrow 80$ slot per p.

$3,000,000$ t of 2 (index) $\rightarrow \frac{6,000,000}{80} = 75,000$ p. $\rightarrow 67\%$ rule ($\times 1.5$) $\rightarrow 112,500$ p.

$$F = \frac{40+20}{2} = 30$$

$\log_{30} 112500 =$ access first theater

$$\frac{300}{27} = 12 \text{ p to store 300 equal theaters}$$

$$TOT = \log_{30} 112500 + 13 + \frac{300}{27} = 3 + 13 + 300 = 316 \text{ p.a.}$$

\downarrow access date and cost

4) Page based = for each page in R scan S and check each page of it
 Cost = $B(R) + B(R) \times B(S) = 5000 + 5000 \cdot 2000 = 10,005,000$ p.a.
 \downarrow load R \downarrow for each page of R scan all pages of S

Block based = load block of M pages ($w_2 = M + 2$)

$$\text{Cost} = B(R) + \frac{B(S)}{M} \times (1 + B(R)) = 5000 + 2000 \cdot (1 + 50) = 107,000 \text{ p.a.}$$

\downarrow load R for each block of $B(R)/M$ read all pages of S

5) Since $70K + 20K \leq 200 \cdot 193 \cdot 193 \rightarrow 3$ pass algorithm based on hashing.

$$\text{Cost} = (2K-1)(B(R) + B(S)) = 5(70000 + 20000) = 450,000 \text{ p.a.}$$

Hash each relation in 193 buckets and then recursively perform intersection one pair at time