Solusi Latihan PPT Concurrency Control

9.1. Two Phase Locking & Deadlock

Exercise 9.1

Consider the following two transactions:

T1:   read (A)   T2:   read (B)
        read (B)   read (A)
        B := B + 0.1*A   A := A – 0.05*B
        write (B)   write (A)

a) Add lock and unlock instructions to both transactions so that they follow the two-phase locking protocol.

b) Can the execution of these two transactions result in a deadlock?

a. Two Phase Locking

Exercise 9.1 – Solution (a)

Add lock and unlock instructions to both transactions so that they follow the two-phase locking protocol.

T1: lock-S (A)   T2:   lock-S (B)
      read (A)   read (B)
      lock-X (B)   lock-X (A)
      read (B)   read (A)
      B := B + 0.1*A   A := A – 0.05*B
      write (B)   write (A)
      unlock (A)   unlock (B)
      unlock (B)   unlock (A)

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b. Deadlock

Exercise 9.1 – Solution (b)

Can the execution of these two transactions result in a deadlock?

T1:	T2:	CC Manager
lock-S (A)		grant-S (A, T1)
read (A)		
	lock-S (B)	grant-S (B, T2)
	read (B)	
lock-X (B)		queue-X (B, T1) – T1 wait for T2
	lock-X (A)	queue-X (A, T2) – T2 wait for T1
	deadlock	

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9.2. Legal Two-phase Locking

Problem

Exercise 9.2

Is the following schedule a two-phase locking (2PL) schedule (legal under 2PL protocol)?

R1(A); R2(A); R3(B); W1(A); R2(C); R2(B); W2(B); W1(C);

Solution

Exercise 9.2 – Solution

R1(A); R2(A); R3(B); W1(A); R2(C); R2(B); W2(B); W1(C);

Add lock and unlock instructions to the schedule:

- T1 reads and then writes A → needs exclusive lock on A before R1(A)

LX1(A); R1(A); R2(A); R3(B); W1(A); R2(C); R2(B); W2(B); W1(C);

- T2 reads (only) A → needs shared lock on A before R2(A). Since A is locked exclusively by T1, shared lock on A by T2 can not be granted.

Therefore, the schedule is not a 2PL schedule.

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9.3. Automatic Acquisition of Lock

Problem

Exercise 9.3

Instructions from T1, T2, and T3 arrive in the following order.

R1(A); R2(A); R3(B); W1(A); R2(C); R2(B); C3; W2(B); C2; W1(C); C1;

What is the final *schedule* if the *2-phase locking with automatic acquisition of locks* is implemented by CC Manager?

Solution
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Solution

*disclaimer on
⇒ **LS1(A); R1(A); LS2(A); LS3(B); LS2(C); LS2(B); C3; UL(B); LX2(B); C2; UL(B); UL(C); UL(A); LX1(A); LX1(C); C1; UL(X); UL(A)**
⇒ Sebenernya sama aja kayak yang 9.4. wait-die

9.4. Deadlock Handling

Problem

Exercise 9.4 – Deadlock Prevention

Instructions from T1, T2, and T3 arrive in the following order (the same as Exercise 9.3).

R1(A); R2(A); R3(B); W1(A); R2(C); R2(B); C3; W2(B); C2; W1(C); C1;

What is the final *schedule* if the *2-phase locking with automatic acquisition of locks* with

    a. wait-die deadlock prevention scheme
    b. wound-wait deadlock prevention scheme

is implemented by CC Manager?
Assume that Timestamp (T1,T2,T3)=(1,2,3)

Solution

a. Wait-die
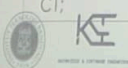
Credit to Evelyn Yosiana

b. Wound-wait

Credit to Evelyn Yosiana