

Extra Practice

- Is the schedule at right:

T ₁	T ₂
	r(B)
r(B)	w(B)
w(A)	r(A)
c	c

- conflict serializable?

yes. the only conflicts are:

- $r_1(B) \dots w_2(B)$: T₁ → T₂
- $w_1(A) \dots r_2(A)$: T₁ → T₂

and thus it is equivalent to T₁;T₂

- serializable?

yes. *all* conflict serializable schedules are also serializable

- recoverable?

yes. the only dirty read is T₂'s read of T₁'s write of A, and T₂ commits after T₁ as required.

- cascadeless?

no, because there's a dirty read.

if T₁ is rolled back after T₂ reads A, we must roll back T₂, too!

Extra Practice

- What scenarios involving the schedule at right could produce cascading rollbacks?

T ₁	T ₂	T ₃
		w(C)
	r(C)	
r(B)	w(B)	
w(A)		r(A)
...

- T₁ is rolled back sometime after T₃ reads A

- T₃ read T₁'s write of A, so T₃ should be rolled back, too

- T₂ is rolled back sometime after T₁ reads B

- T₁ read T₂'s write of B, so T₁ should be rolled back, too

- T₃ is rolled back sometime after T₂ reads C

- T₂ read T₃'s write of C, so T₂ should be rolled back, too

Is This Schedule Conflict Serializable?

- Draw the precedence graph to find out!

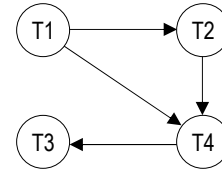
$w_1(A); r_2(B); r_2(A); r_4(A); w_2(B); r_4(B); w_4(C); r_3(D); w_3(C)$

$w_1(A) \dots r_2(A)$ means $T1 \rightarrow T2$

$w_1(A) \dots r_4(A)$ means $T1 \rightarrow T4$

$w_2(B) \dots r_4(B)$ means $T2 \rightarrow T4$

$w_4(C) \dots w_3(C)$ means $T4 \rightarrow T3$



no cycles, so conflict serializable.

- A. Yes. It is equivalent to the serial schedule $T1;T2;T3;T4$
- B. **Yes. It is equivalent to the serial schedule $T1;T2;T4;T3$**
- C. No. The graph includes the cycle $T1 \rightarrow T4 \rightarrow T2 \rightarrow T1$
- D. No. The graph includes the cycle $T1 \rightarrow T2 \rightarrow T4 \rightarrow T1$

What If We Add This Write?

- Draw the precedence graph to find out!

$w_1(A); r_2(B); r_2(A); r_4(A); w_2(B); r_4(B); w_4(C); r_3(D); w_3(C); w_1(D)$

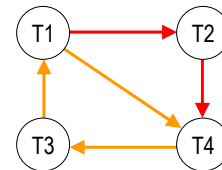
$w_1(A) \dots r_2(A)$ means $T1 \rightarrow T2$

$w_1(A) \dots r_4(A)$ means $T1 \rightarrow T4$

$w_2(B) \dots r_4(B)$ means $T2 \rightarrow T4$

$w_4(C) \dots w_3(C)$ means $T4 \rightarrow T3$

$r_3(D) \dots w_1(D)$ means $T3 \rightarrow T1$



cycles:

$T1 \rightarrow T2 \rightarrow T4 \rightarrow T3 \rightarrow T1$

$T1 \rightarrow T4 \rightarrow T3 \rightarrow T1$

not conflict serializable