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Transactions

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Database Systems I. Seminar

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Recap

- Transaction properties: **A**tomicity, **C**onsistency, **I**solation, **D**urability; (ACID)
- Scheduling
- Conflicting transactions
- Conflict equivalent schedules
- View equivalent schedules
- Conflict serializable
- precedence graph
- locking techniques
- two phase protocol



Examples

- We have these two transaction, what is the result if we run: $S1(T1, T2)$, and what is the result if we run $S2(T2, T1)$. The initial values are: $x=15$; $y=5$; $N=5$; $M=10$

T1	T2
read(x)	read(x)
$x:=x-N$	$x:=x+M$
write(x)	write(x)
read(y)	
$y:=y+N$	
write(y)	



Examples

- Given the following scheduling, what will be the result with the same initial values: $x=15$; $y=5$; $N=5$; $M=10$

T1	T2
read(x)	
$x:=x-N$	
	read(x)
	$x:=x+M$
write(x)	
read(y)	
	write(x)
$y:=y+N$	
write(y)	



Examples

- Is the following schedule conflict serializable?

T1	T2
read(x)	
write(x)	
	read(x)
read(y)	
	write(x)
write(y)	



Examples

- Are the following two schedules view equivalent?

T1	T2	T1	T2
read(X) 1		read(X) 1	
X:=X-N 2		X:=X+M 2	
	3 read(X)		3 read(X)
	4 X:=X+M		4 X:=X-N
write(X) 5			5 write(X)
Read(Y) 6		write(X) 6	
	7 write(X)	read(Y) 7	
Y:=Y+N 8		Y:=Y+N 8	
write(Y) 9		write(Y) 9	



Examples

- Is the following schedule conflict serializable? (draw the precedence graph)

T1	T2	T3	T4
	read(A)		
read(B)			
write(A)			
		read(C)	
		write(B)	
read(C)			
			read(B)



Examples

- What will be the result of $S1(T1, T2)$ and $S2(T2, T1)$, if the initial values are: $X=20$, $Y=10$?

T1	T2
s-lock(y)	s-lock(x)
Read(y)	Read(x)
Unlock(y)	Unlock(x)
x-lock(x)	s-lock(y)
read(x)	Read(y)
$X:=X-Y/2$	Unlock(y)
Write(x)	x-lock(y)
Unlock(x)	read(y)
s-lock(y)	$Y:=Y+X$
read(y)	Write(y)
unlock(y)	unlock(y)



Examples

- Mark the two phases in the following scheduling:

T1	T2
s-lock(Y);	s-lock(X);
read(Y) ;	read(X) ;
x-lock(X) ;	x-lock(Y) ;
unlock(Y) ;	unlock(X) ;
read(X) ;	read(Y) ;
X:=X+Y;	Y:=X+Y;
write(X) ;	write(Y) ;
unlock(X) ;	unlock(Y) ;