
Exercise 1

1 Point

Identify which of the properties: **conflict serializable**, **recoverable**, **cascadeless**, are fulfilled by the following schedule. If a property is not fulfilled, explain why.

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

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Exercise 2

1 Point

Consider the following schedule. State if it is **conflict serializable** and explain why. Give an equivalent serial schedule if possible.

T1:	T2:	T3:	T4:
read(X)			
	write(X)		
		read(X)	
read(Y)			
	write(Y)		
read(Z)			
		write(Z)	
			read(Z)
			write(Z)

Exercise 3

1 Point

Consider the following schedule and the **two-phase locking** scheduler.

T1:	T2:	T3:
read(X)		
	write(X)	
		read(X)
write(X)		
		write(X)

Does the schedule result in a deadlock? If yes, what would happen to the transactions according to the wound-wait deadlock prevention protocol (assume $TS(T1) < TS(T2) < TS(T3)$)?

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Exercise 4

1 Point

Can the following schedule be the output of a strict two-phase locking scheduler? If yes, show the schedule with all required lock and unlock instructions. Otherwise, explain why.

T1: T2: T3:

read(X)

read(Y)

 read(X)

 write(X)

 read(X)

read(Z)

write(Z)

COMMIT

 write(Y)

 COMMIT

 read(V)

 COMMIT

Consider the following schedule and the **validation based** scheduler. The timestamps correspond to operation order.

T1:	T2:	T3:	T4:
start			
	start		
	validate		
			start
		start	
	finish		
validate			
finish			
		validate	
			validate
		finish	
			finish

The objects in the database that can be read or written are: A, B, C, D, E, F.

The read and write sets of the transactions are:

T1: R-set(T1)={A,B}, W-set(T1)={C,D}
 T2: R-set(T2)={A,C}, W-set(T2)={D,F}
 T3: R-set(T3)={C,E}, W-set(T3)={B,F}

Answer the following questions.

1. Does T1 successfully validate?

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2. Suppose that the validation of T4 and all previous validations succeeded. What could have been the largest read set of T4?

Exercise 6

1 Point

With the initial values $A=100$, $B=200$, $C=300$, write the log file for the following schedule. What happens during the recovery according to the recovery algorithm? Specify the resulting compensation log records.

T1:	T2:	T3:

	START	

START		

		START

		read(C)

	read(B)	

read(A)		

A:=A-20		

		C:=C+40

		write(C)

	B:=B-80	

write(A)		

	write(B)	

COMMIT		

-----CRASH-----		

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Exercise 7

1 Point

Consider the following schedule. Indicate what happens when the schedule is processed by a **multiversion timestamp-ordering** scheduler. The transactions start in order with $TS(T1)=1$, $TS(T2)=2$, $TS(T3)=3$, $TS(T4)=4$. Assume that no versions of data item A exist.

T1:	T2:	T3:	T4:
<hr/>			
write(A)			
<hr/>			
			write(A)
<hr/>			
		read(A)	
<hr/>			
	write(A)		
<hr/>			

Why does the following schedule **NOT** adhere to the **timestamp-ordering** protocol?

$TS(T1)=1$, $TS(T2)=2$, $TS(T3)=3$

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