



Pázmány Péter Catholic University
Faculty of Information Technology and Bionics

Transactions/Recovery

Tamas Zsedrovits, Ph.D.

Database Systems I. Seminar

2018 Spring Semester

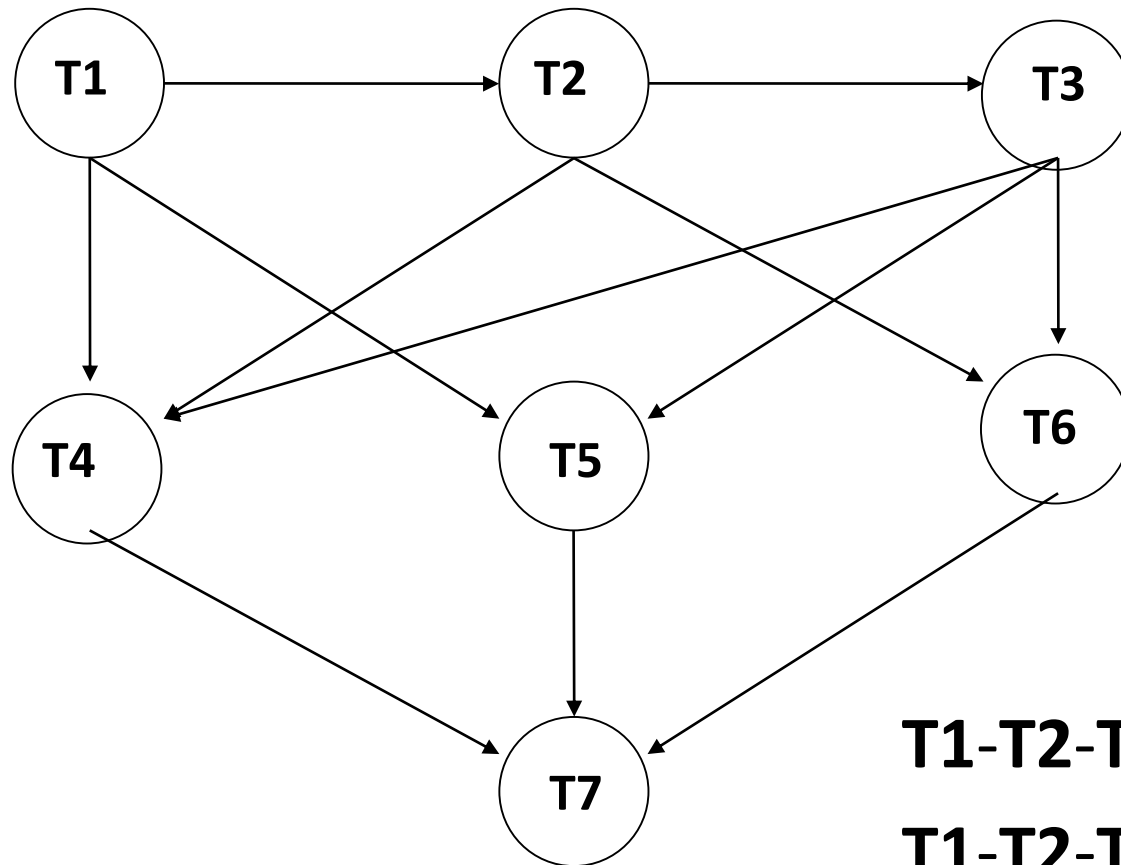


Recap

- Transaction properties:
Atomicity, **C**onsistency,
Isolation, **D**urability;
(ACID)
- Timestamping
- Thomas' Writing Rule



Is the following schedule serializable based on the precedence graph? If it is, give at least two serial schedules!

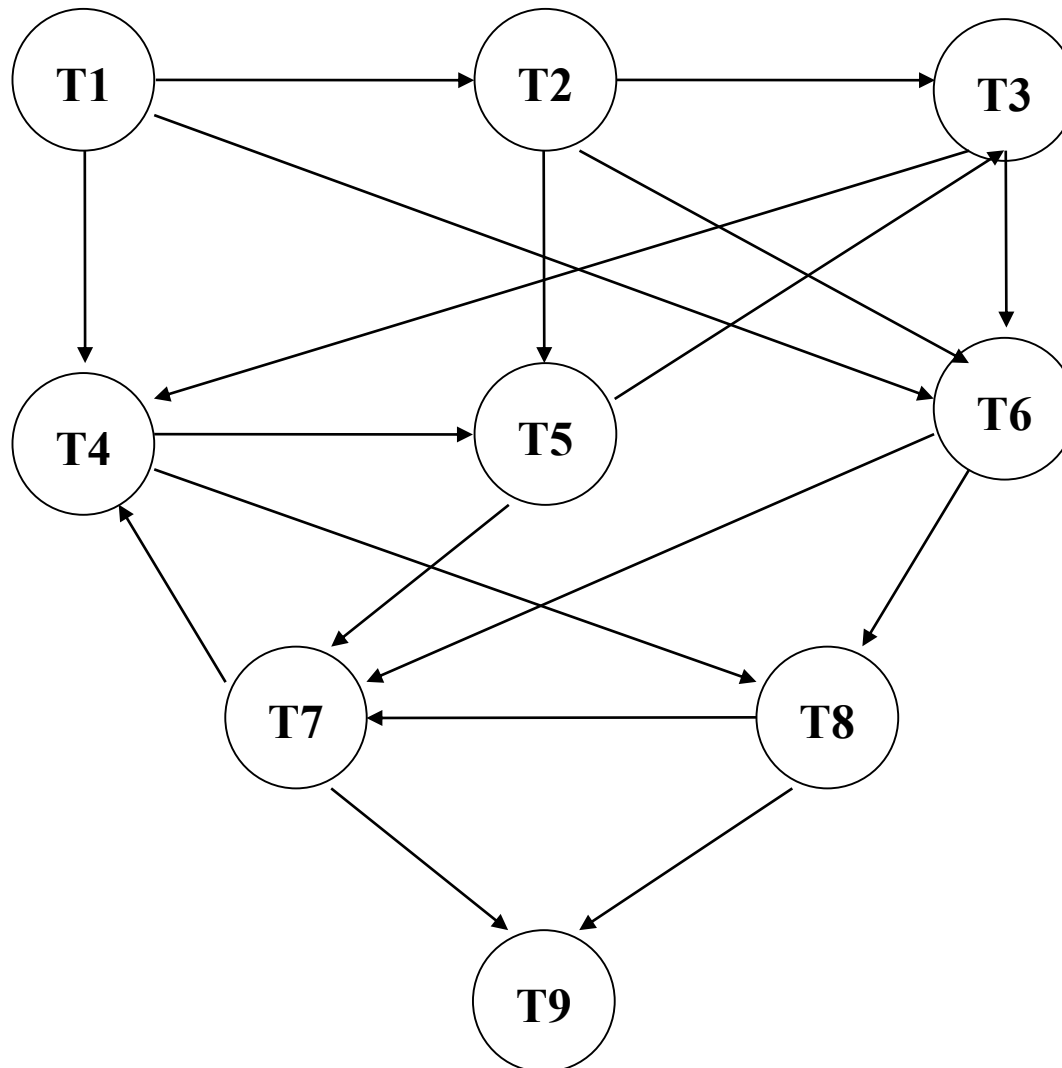


T1-T2-T3-T4-T5-T6-T7

T1-T2-T3-T5-T4-T6-T7



Is the following schedule serializable based on the precedence graph? If it is, give at least two serial schedules!





What will be the result of the following schedule (timestamps, aborted transactions)? Can you apply the Thomas' write rule?

	T1	T2	T3	T4	T5
1.		read(X)			
2.			write(Z)		
3.	read(X)				
4.				read(X)	
5.			read(X)		
6.		write(Y)			
7.				read(Y)	
8.		read(Z)			
9.	write(X)				
10.					read(X)
11.			read(Y)		
12.					write(Y)
13.				write(Y)	



What will be the result of the following schedule (timestamps, aborted transactions)? Can you apply the Thomas' writing rule?

	T1	T2	T3	T4	T5
1.					read(X)
2.		read(Y)			
3.	read(Y)				
4.			write(Y)		
5.			write(Z)		
6.					read(Z)
7.		read(X)			
8.	read(X)				
9.			write(Z)		
10.					write(Y)
11.					write(Z)



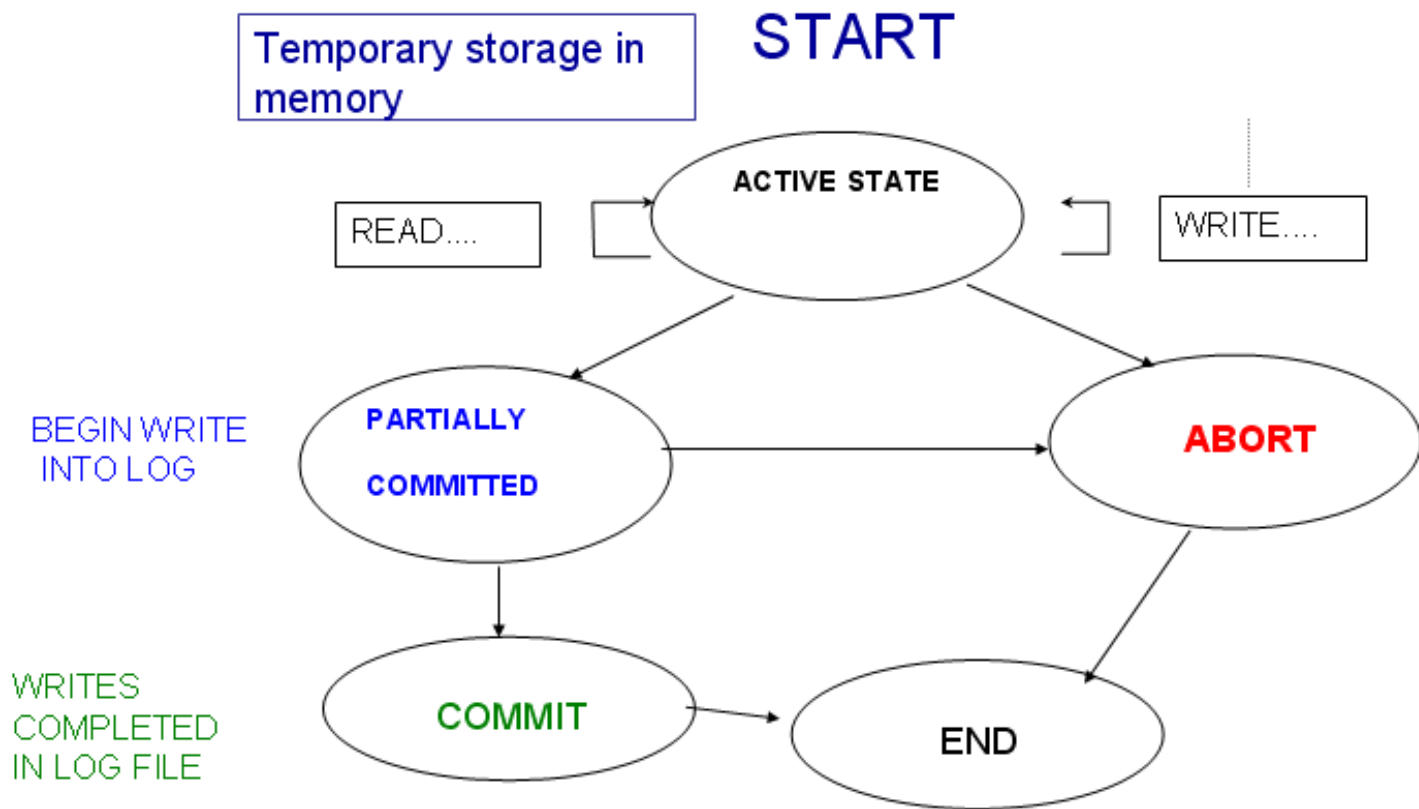
Recap

- Recovery
 - Logging
 - Shadowing, shadow paging
- Log file
- Checkpoints
- Deferred modification
 - REDO
 - UNDO
- Immediate modification



Recap

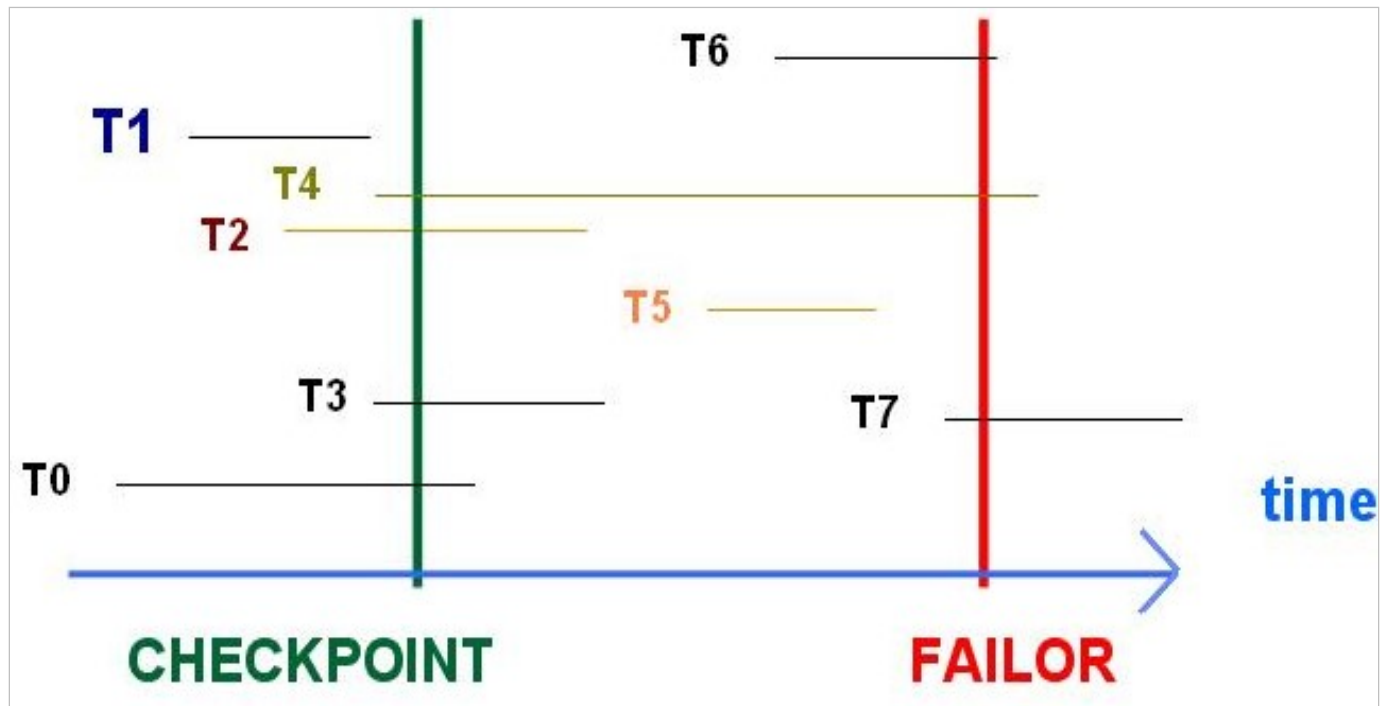
- Logging





Example







- What will be the process of recovery?





A part of a log-file is given as follows:

- a) Which logging technique is applied?
 - b) Give the initial values of A, B, C.
 - c) Give the values of A, B, C after step 11.
 - d) Describe how the system can be recover if a crash occur between 9-10?
 - e) Rewrite this log to use only REDO and give the recovery process if a crash occur between 10-11.
1. <T6, START>
 2. <T6, A, 500, 370>
 3. <CHECKPOINT, [T6]>
 4. <T7, START>
 5. <T7, C, 410, 85>
 6. <T6, B, 400, 90>
 7. <T6, COMMIT>
 8. <T7, A, 370, 250>
 9. <T8, START>
 10. <T7, COMMIT>
 11. <T8, B, 90, 800>
 12. <T8, COMMIT>

Transactions			REDO		UNDO		UNDO+REDO	
T1	T2	T3	LOG 	DB 	LOG 	DB 	LOG 	DB 
T1 connect			<T1, START>		<T1, START>		<T1, START>	
read(A)								
A:=A-50								
write(A)			<T1, A, 950>		<T1, A, 1000>		<T1, A, 1000, 950>	
						upd: A=950		upd: A=950
	T2 connect		<T2, START>		<T2, START>		<T2, START>	
	read(C)							
	C:=C+100							
read(B)								
B:=B+50								
write(B)*			<T1, B, 2050>		<T1, B, 2000>		<T1, B, 2000, 2050>	
						upd: B=2050		upd: B=2050
T1 finish			<T1, COMMIT>		<T1, COMMIT>		<T1, COMMIT>	
			save log	upd: A=950 B=2050				
		T3 connect	<T3, START>		<T3, START>		<T3, START>	
		read(B)						
CheckPoint			<CHECKPOINT, [T2, T3]>		<CHECKPOINT, [T2, T3]>		<CHECKPOINT, [T2, T3]>	
	write(C)*		<T2, C, 600>		<T2, C, 500>		<T2, C, 500, 600>	
						upd: C=600		upd: C=600
		B:=B-1250						
		write(B)	<T3, B, 800>		<T3, B, 2050>		<T3, B, 2050, 800>	
						upd: B=800		upd: B=800
	T2 finish		<T2, COMMIT>		<T2, COMMIT>		<T2, COMMIT>	
			save log	upd: C=600				
		T3 finish	<T3, COMMIT>		<T3, COMMIT>		<T3, COMMIT>	
			save log	upd: B=800				