B561 Assignment 6: Transaction Management and Recovery
Solutions

C.M. Wyss

December 18, 2003

1. Give examples of the 13 schedule classes from the Venn Diagram given in class (including serial schedules). Each example you give should contain exactly 3 conflicts per transaction.

   Solution: We assume a transaction "owns" a conflict if it is the transaction whose action causes the conflict (temporally). Assuming this, note that serial schedules cannot satisfy the "3 conflicts per transaction" rule. Additionally, since conflict serializable schedules must maintain the order of all conflicts (with respect to a serial schedule), this means that no conflict serializable schedule can satisfy the "3 conflicts" rule either. We are thus left with only 8 possibilities (all of which can be satisfied):

   (a) Not view serializable, not recoverable:

T_1	R(A)					R(A)	Cmt	
T_2		W(A)	W(A)	W(A)				Cmt

   (b) Not view serializable, recoverable but not cascade-free:

T_1	R(A)				R(A)		Cmt
T_2		W(A)	W(A)	W(A)		Cmt	

   (c) Not view serializable, cascade-free but not strict:

T_1	R(A)				W(A)		Cmt
T_2		W(A)	W(A)	W(A)		Cmt	

   (d) Not view serializable, strict:

T_1	R(A)					W(A)	Cmt
T_2		W(A)	W(A)	W(A)	Cmt		

   (e) View serializable, not conflict serializable, not recoverable:

   Not possible with the additional requirement. (Exercize)

(f) View serializable, not conflict serializable, recoverable but not cascade-free:
Not possible with the additional requirement. (Exercize)

(g) View serializable, not conflict serializable, cascade-free but not strict:

T_1	W(A)				W(A)	Cmt	
T_2		W(A)	W(A)	W(A)			Cmt

(h) View serializable, not conflict serializable, strict:
Not possible with the additional requirement. (Exercize)

2. Prove or disprove the following statements.

(a) Every strict schedule admits 2PL.
This is false. Here's a counterexample:

T_1	R(A)			R(A)	Cmt
T_2		W(A)	Cmt		

(b) Every strict schedule admits strict 2PL.
Since strict schedules don't always admit (plain) 2PL and strict 2PL is stronger, we can immediately see this is also false.

(c) Every strict schedule that is also conflict serializable admits strict 2PL.
This is false. Here's a counterexample:

T_1	R(A)		R(B)		Cmt
T_2		W(A)		Cmt	

(d) Every strict schedule that contains no WAR conflicts admits strict 2PL.
This is true. We only need consider what happens with RAW or WAW conflicts. Both of these cases are covered by the notion of strict schedule; i.e. the "R" in RAW can't happen until the previous transaction has committed, and the first "W" in WAW can't happen until the previous transaction has committed. Thus, the locks will be released appropriately, as required for strict 2PL.

(e) Suppose the following: if a schedule contains writes, these are blind writes. Schedules that satisfy this are always recoverable.
This is false. Here's a counterexample.

T_1	W(A)			Cmt
T_2		R(A)	Cmt	

(f) Every view serializable schedule that contains no blind writes is conflict serializable.
This is true. The contrapositive was proved in assignment 6, question 4 of fall 2000.