**CS 5200 Homework 10** (Chapter 12 Connolly & Begg)

Each question is worth 10 points each.

1. Given the following 2 different transactions. List all potential schedules for T1 and T2 and determine which schedules are conflict serializable and which are not. (10 POINTS)

Transaction 1 Transaction 2

READ(X) READ(X)

X = X -N; X = X +M

WRITE(X) WRITE(X)

READ(Y)

Y = Y + N

WRITE(Y)

1. Which of the following schedules is conflict serializable? For each serializable schedule determine the equivalent serial schedule.(10 POINTS)

Schedule 1 Schedule 2 Schedule 3

T1 Read(X) T1 Read(X) T3 Read(X)

T3 Read(X) T3 Read(X) T2 Read(X)

T1 Write(X) T3 Write(X) T3 Write(X)

T2 Read(X) T1 Write(X) T1 Read(X)

T3 Write(X) T2 Read(X) T1 Write(X)

1. Draw the precedence graph for the 3 schedules in problem 2. (20 POINTS)
2. Provide a schedule that exhibits the deadlock problem. Describe the issue. (10 POINTS)
3. Apply the timestamping algorithm to the following schedule. State if it can be performed as is or what transactions will need to be restarted given the basic timestamping ordering algorithm. (20 POINTS)

| TIME | Transaction A | Transaction B | Transaction C |
| --- | --- | --- | --- |
| 1 |  | READ(Z) |  |
| 2 |  | READ(Y) |  |
| 3 |  | WRITE(Y) |  |
| 4 |  |  | READ(Y) |
| 5 |  |  | READ(Z) |
| 6 | READ(X) |  |  |
| 7 | WRITE(X) |  |  |
| 8 |  |  | WRITE(Y) |
| 9 |  |  | WRITE(Z) |
| 10 |  | READ(X) |  |
| 11 | READ(Y) |  |  |
| 12 | WRITE(Y) |  |  |
| 13 |  | WRITE(X) |  |

1. Below is a log corresponding to a particular schedule at the point of a system crash for 4 transactions T1, T2, T3, and T4. Suppose that we use the immediate update protocol with checkpointing. Describe the recovery process from the system crash. Specify which transactions are rolled back, which operations in the log are redone and which operations in the log are undone. State whether any cascading rollbacks take place. (20 POINTS)

| Start TRANSACTION 1 |
| --- |
| T1 READ(A) |
| T1 READ(D) |
| T1 WRITE(D, 20, 25) |
| COMMIT T1 |
| CHECKPOINT |
| Start TRANSACTION T2 |
| T2 READ(B) |
| T2 WRITE B 12, 18 |
| Start TRANSACTION T4 |
| T4 READ(D) |
| T4 WRITE (D, 25, 15) |
| START TRANSACTION T3 |
| T3 WRITE(C,30,40) |
| T4 READ(A) |
| T4 WRITE(A, 30, 20) |
| T4 COMMIT |
| T2 READ(D) |
| T2 WRITE(D,15,25) |
| SYSTEM CRASH |

1. Describe what a cascading rollback is. (10 points)

**Homework submission**

Create a pdf file named hwk10lastnamefi.pdf, where lastname is your last name and fi is your first initial.