The University of New South Wales

COMP9315 DBMS Implementation Final Exam

[Instructions] [Notes] [PostgreSQL] [C]
[Q1] [Q2] [Q3] [Q4] [Q5] [Q6] [Q7] **[Q8]**

Question 8 (6 marks)

Consider the followng three transactions:

```
T1:                 T2:                 T3:
read(X)             read(Y)             read(X)
X = X + 1           Y = Y * 2           read(Y)
write(X)            read(X)             X = X - Y
read(Y)             X = X + Y           Y = Y - 3
Y = Y + 1           write(Y)            write(X)
write(Y)            write(X)            write(Y)
commit              commit              commit
```

Consider also the following concurrent schedule on these three transactions:

```
T1: R(X)      W(X)      R(Y)                  W(Y) C       |
T2:     R(Y)                  R(X)      W(Y)        W(X)  | system
T3:               R(X)            R(Y)                    | failure
```

Note that we have omitted the computation on `X` and `Y` from the schedule. You should assume that it occurs somwhere between the read and the write of the relevant variable. The line of | symbols indicates where a system failure occurred.

Making the following assumptions:

- `R` = read, `W` = write, `C` = commit, `A` = abort
- initial value of `X` was 5, initial value of `Y` was 2
- the system uses write-ahead undo/redo logging
- log entries are written to disk just before the relevant `write` operation starts
- the log is empty before `T1` starts; scans of the log can go all the way to its start
- the transaction descriptions show all of the *intended* operations
- any operations not completed before system failure do not actually happen

answer these questions:

a. Show all entries written to the log as the transactions progress in the given schedule (include <start T_i>, <abort T_i>, and <commit T_i>, entries as well as entries for updates)

b. Show how recovery takes place when the system restarts after the system failure

- which transactions are placed on the undo and redo lists
- which undo operations occur; which redo operations occur

Show all working.

Instructions:

- Type your answer to this question into the file called `q8.txt`
- Submit via: **`give cs9315 exam_q8 q8.txt`**
  or via: Webcms3 > exams > Final Exam > Submit Q8 > Make Submission

End of Question