Purdue University
Computer Science Department
CS44800 Homework 5
Fall 2019

Due: **November 25, 2019, 11:59PM**
Total Points: **3 points**
Submit via Blackboard

Provide concise but to the point explanation to support your answers. If possible, use bullets to organize the ideas in your answer.

Question 1. (1.5 point)

Consider the following schedules, where R, W, C stands for 'Read', 'Write' and 'Commit' respectively and subscripts refers to transactions (i.e., $R_1(X)$ means transaction T_1 read *X*):

Schedule 1: $R_1(X), W_1(X), R_3(X), W_3(X), W_2(X), R_1(Y), W_1(Y), C_1, W_3(Y)\ C_3, R_2(Y), W_2(Y)\ C_2$

Schedule 2: $R_2(X), W_2(X), R_3(Y), W_3(Y), R_3(Z), W_3(Z), C_3, R_2(Z), W_2(Z), C_2, R_1(X), W_1(X), C_1$

Schedule 3: $W_1(A), W_2(B), W_3(C), R_1(X), R_2(X), R_1(Y), W_1(X), C_1, W_2(Y), C_2, W_3(Y), C_3$

For each schedule answer the following question:

(a) Is this schedule conflict serializable? If yes, provide an equivalent serial schedule of transactions.
(b) Does the schedule avoid cascading aborts? Explain your answer.
(c) Assuming 2PL protocol were operations are skipped if the transaction cannot acquire a lock and deadlocks are handled using a wait-for graph, like Project 4. Furthermore, once a transaction commits, all the locks held are released and the operations that were on hold are retried – according to the priority in the schedule. Is the schedule possible under this 2PL protocol (i.e. all transactions can be committed)? Explain your answer. If the 2PL protocol leads to a deadlock, give the wait-for graph.

Question 2. (1.5 point)

(a) Discuss the different types of transaction failures. Explain each failure.
(b) What is the system log used for?
(c) What are checkpoints and why are they important?