University of California, Los Angeles
Department of Computer Science

Computer Science 143 **Prof. Ryan Rosario**

Homework 5

Due Friday, June 8, 2018 at 11:59pm on CCLE

Please remember the following:

1. Homework is mostly graded on completion. We may grade a few parts, but it will never be the majority of the grade on the assignment. So try your best, and focus on solving the problems. Consider homework (and studying the solutions) as practice for the final exam.
2. Homework must be submitted digitally, on CCLE. We will not do any paper grading. You can use a text file, but if you use Word, a PDF is preferred rather than a DOC file.
3. Solutions will be posted.
4. **Students are bound by the signed Academic Integrity Agreement. Students copying off of each other (or from other sources) or having unusually similar responses (without citing who they worked with), are easy to identify and will receive a grade of 0.**

1. We will use the following transaction schedule S for this problem. Assume autocommit is enabled.

T_1	T_2	T_3	T_4
		`write(A)`	
`read(A)`			
`write(B)`			
	`read(B)`		
	`write(C)`		
			`read(B)`

   (a) Is S serial?

   (b) Is S conflict serializable? If so, what are the equivalent serial schedules?

2. Consider the relation `Googler(name, daysoff)` where we store the number of days off a Googler has remaining this year, and `name` is the key. Suppose we execute the following three transactions.

   T_1:

   ```
   SELECT SUM(daysoff) FROM Googler;
   COMMIT;
   ```

   T_2: In this transaction, Google gives everyone an extra day off, and Larry Page gets an additional 10 days off because he is awesome.

   ```
   UPDATE Googler SET daysoff = daysoff + 1;
   UPDATE Googler SET daysoff = daysoff + 10 WHERE name = "Larry Page";
   ```

   T_3: We give a few others some more days off in this transaction. We will also set the number of days off for Xooglers to zero.

   ```
   UPDATE Googler SET daysoff = daysoff + 10 WHERE name = "Larry Page";
   UPDATE Googler SET daysoff = 0 WHERE name = "James Damore";
   ```

The `Googler` table originally has two tuples `('Larry Page', 15)` and `('James Damore', 15)`. Assume that *individual* SQL statements execute atomically.

(a) If all three transactions execute under the `SERIALIZABLE` isolation level, list all possible values that can be returned by T_1. Explain your answer.

(b) If T_1 executes under the `READ UNCOMMITTED` isolation level and T_2 under `REPEATABLE READ` access level, and T_3 under the `SERIALIZABLE` isolation level, list all possible values that can be returned by T_1. Explain your answer.