

Transactions I

Tom Kelliher, CS 417

1 Administrivia

Announcements

Assignment

Using the *SQL Commands* chapter in the PostgreSQL online documentation (look under the *Reference* section), review the following SQL commands:

- BEGIN
- COMMIT
- LOCK
- ROLLBACK
- ROLLBACK TO
- SAVEPOINT
- SELECT, the FOR UPDATE/FOR SHARE clause
- SET TRANSACTION

to prepare for the transactions lab.

From Last Time

PL/pgSQL and triggers

Outline

1. Vocabulary
2. Transactions assignment

Coming Up

Transactions labs

2 Vocabulary

1. What is concurrency?
2. What is a transaction?
3. Describe each of the ACID properties:
 - (a) Atomicity
 - (b) Consistency
 - (c) Isolation
 - (d) Durability
4. Describe an example that illustrates how two concurrent transactions could leave a database in an inconsistent state.
5. What is a transaction schedule?
6. Define each of the following:
 - (a) Lost update
 - (b) Dirty read
 - (c) Inconsistent analysis
 - (d) Nonrepeatable read
 - (e) Phantom read
7. What is the difference between the serial execution of transactions and a serializable schedule of transactions?
8. How is serializability achieved?
9. When is a shared lock used? When is an exclusive lock used?
10. Describe a situation that illustrates deadlock.
11. Describe two-phase locking.

12. How is timestamping used to control transaction concurrency?
13. Describe three different scenarios which would require that a database be recovered.
14. Describe the ARIES recovery algorithm.

3 Transactions Assignment

These problems are from Chapter 9 of the third edition of the textbook, starting on pg. 437.

1. 9.4
2. 9.5. See Figure 9.3 on pg. 399 for an example of what your concurrent schedule should look like.
3. 9.6. See Figure 9.12 on pg. 411 for an example of what your schedule should look like.
4. 9.7. See Figure 9.15 on pg. 417 for an example of what your schedule should look like. Note that the t_7 row of the figure is wrong — all the entries should be shifted one cell to the *right*, except for the first entry in the **SUMBAL** column.
5. 9.13. Include your precedence graphs.

If you have the fourth edition of the textbook, the problems start on pg. 442.

1. 11.4
2. 11.5. See Figure 11.3 on pg. 406 for an example of what your concurrent schedule should look like.
3. 11.6. See Figure 11.12 on pg. 419 for an example of what your schedule should look like.
4. 11.7. See Figure 11.15 on pg. 424 for an example of what your schedule should look like.
5. 11.13. Include your precedence graphs.