

# Transactions I

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## 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 textbook, starting on pg. 437.

1. 9.4
2. 9.5. See Fig. 9.3 on pg. 399 for an example of what your concurrent schedule should look like.
3. 9.6. See Fig. 9.12 on pg. 411 for an example of what your schedule should look like.
4. 9.7. See Fig. 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 occurrence of  $t_7$ .
5. 9.13. Include your precedence graphs.