Transactions for web developers

Aymeric Augustin - @aymericaugustin

DjangoCong - Belfort - September 28th, 2013

Today's talk

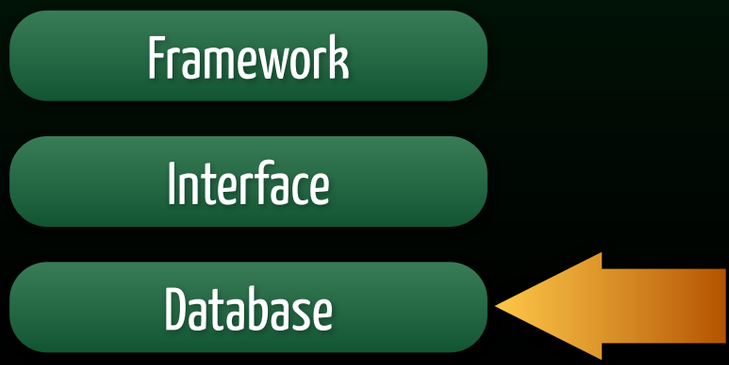
Framework

sqlite3 psycopg2

Interface

Database

Transactions in SQL



Definition

"An **SQL-transaction** (sometimes simply called a "transaction") is a sequence of executions of SQL-statements that is **atomic** with respect to recovery."

Source: http://www.sqlite.org/atomiccommit.html

Definition

"An **SQL-transaction** (sometimes simply called a "transaction") is a sequence of executions of SQL-statements that is **atomic** with respect to recovery."

Source: http://www.sqlite.org/atomiccommit.html

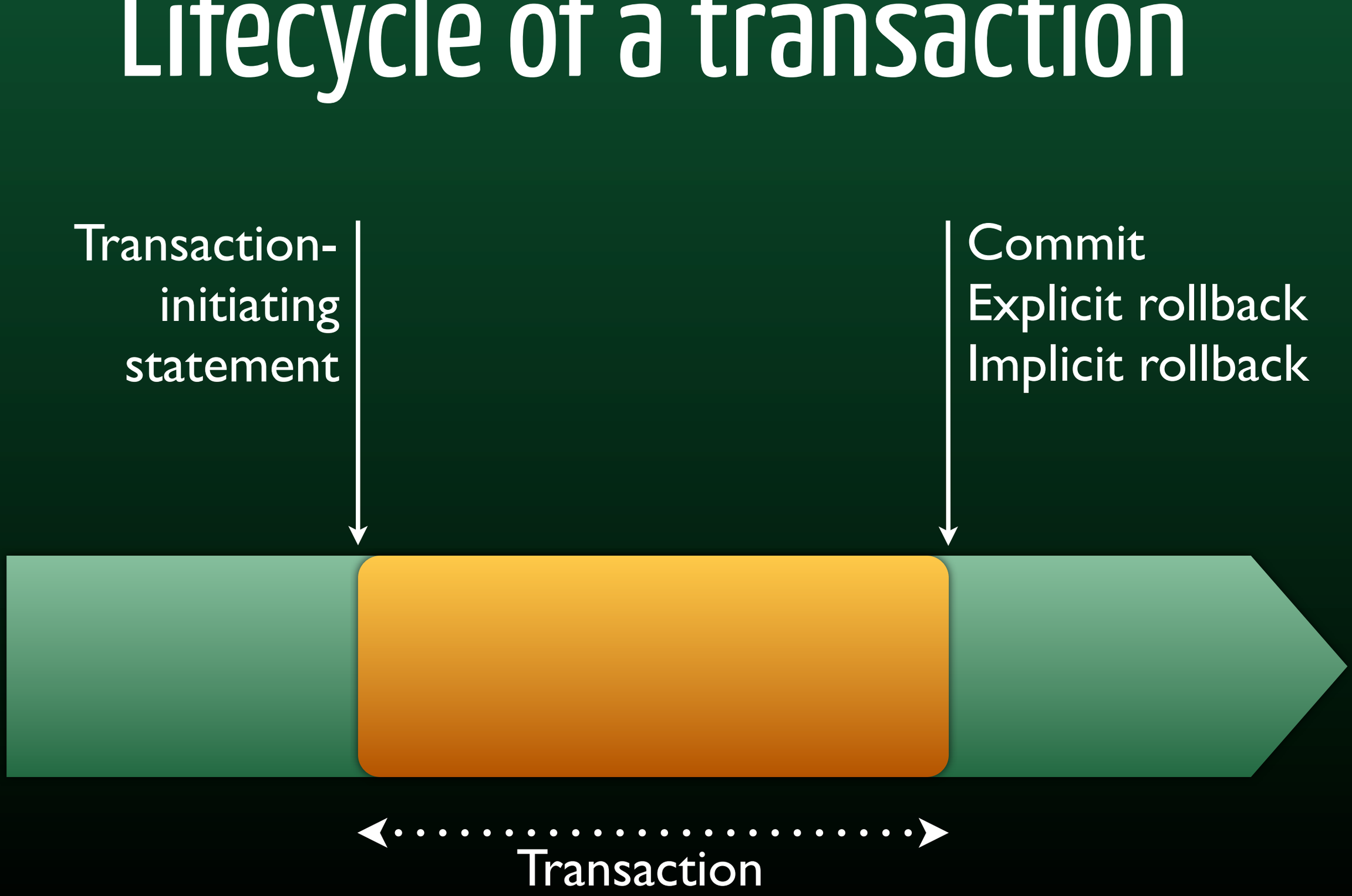
Example

```
BEGIN;

UPDATE  cars
   SET  status = 'available'
 WHERE  id = 1;

UPDATE  rentals
   SET  end = CURRENT_TIMESTAMP
 WHERE  car_id = 1 AND end IS NULL;

COMMIT;                  -- or ROLLBACK;
```

Lifecycle of a transaction

Transaction-initiating statement

Commit
Explicit rollback
Implicit rollback

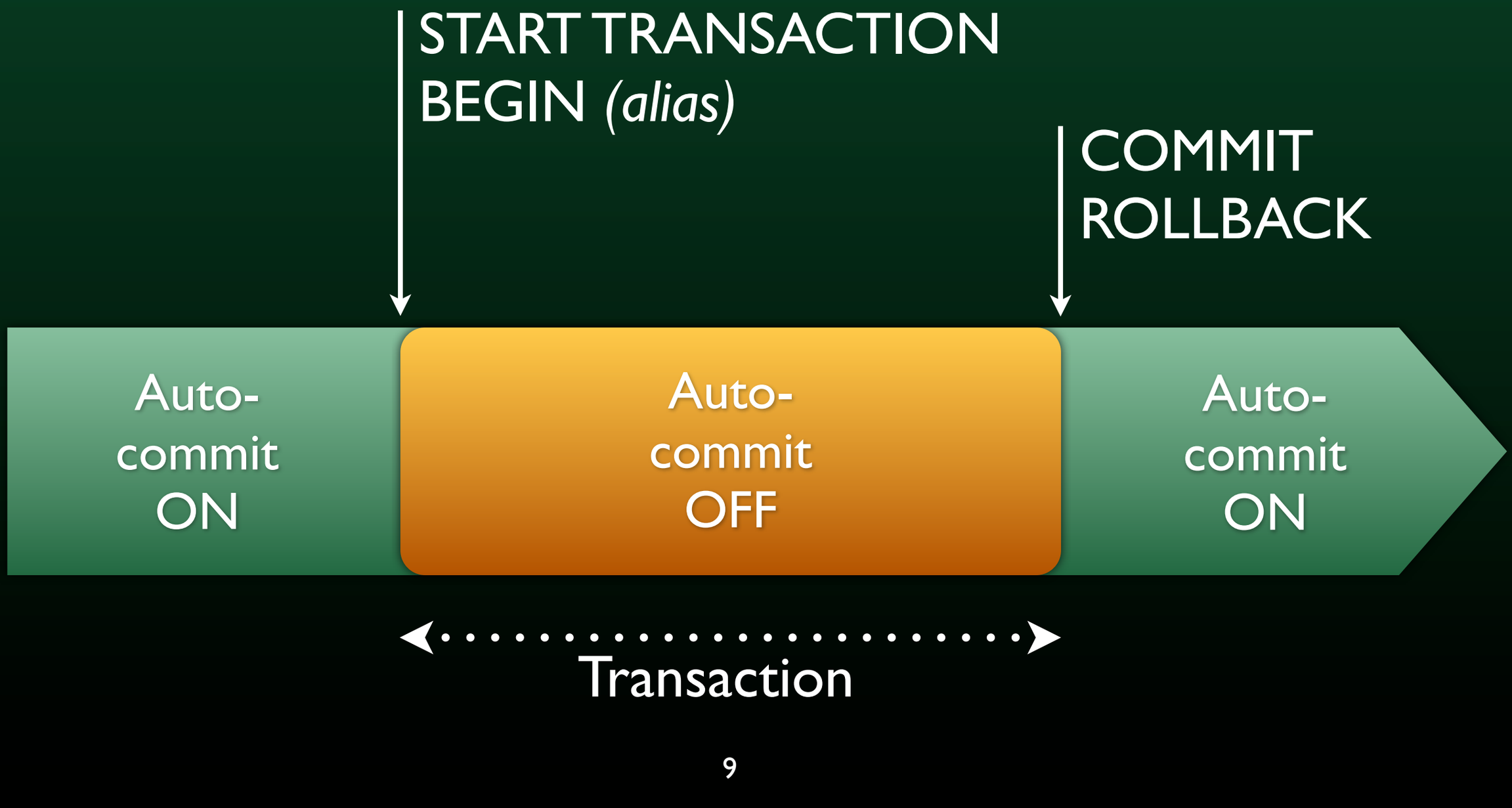


Autocommit

- Commit implicitly after each statement.
- Wrap each statement in its own transaction.
- Just execute my query KTHXBYE!

- SQLite, PostgreSQL, MySQL have autocommit turned on by default.

Lifecycle under autocommit



Savepoints

becomes either

after

SAVEPOINT S3;

or

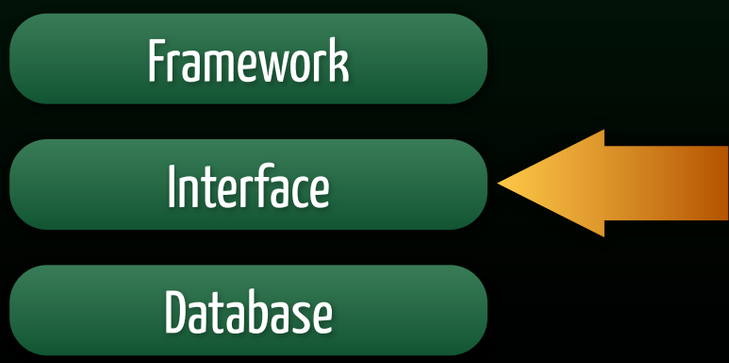
RELEASE SAVEPOINT S2;

or

ROLLBACK TO SAVEPOINT S2;

Python

client libraries



PEP 249

- "If the database supports an auto-commit feature, this must be initially off."
- "An interface method may be provided to turn it back on."
- "Closing a connection without committing the changes first will cause an implicit rollback to be performed."

psycopg2

- Tracks the transaction state.
- Inserts a BEGIN before each statement,
  unless there's already a transaction in progress.
  - Even before SELECT statements.
  - "Idle in transaction".
- cnx.autocommit = True disables this behavior.

sqlite3

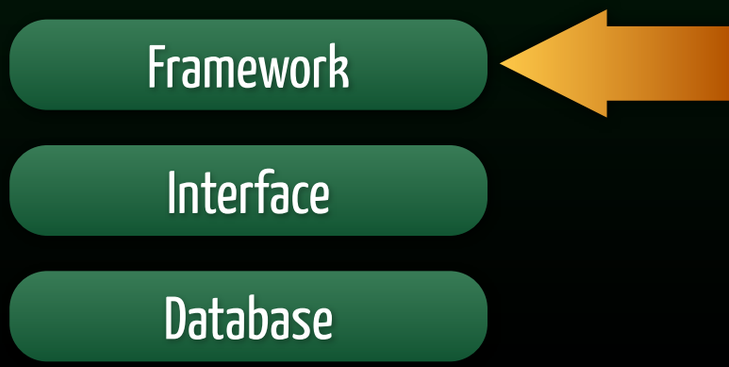
- Tracks the transaction state.
- Parses statements to insert BEGIN or COMMIT:
  - SELECT: —
  - INSERT, UPDATE, DELETE, REPLACE: BEGIN
  - Any other statement: COMMIT
- cnx.isolation_level = None disables this behavior.
- This is totally unrelated to the isolation level!

sqlite3

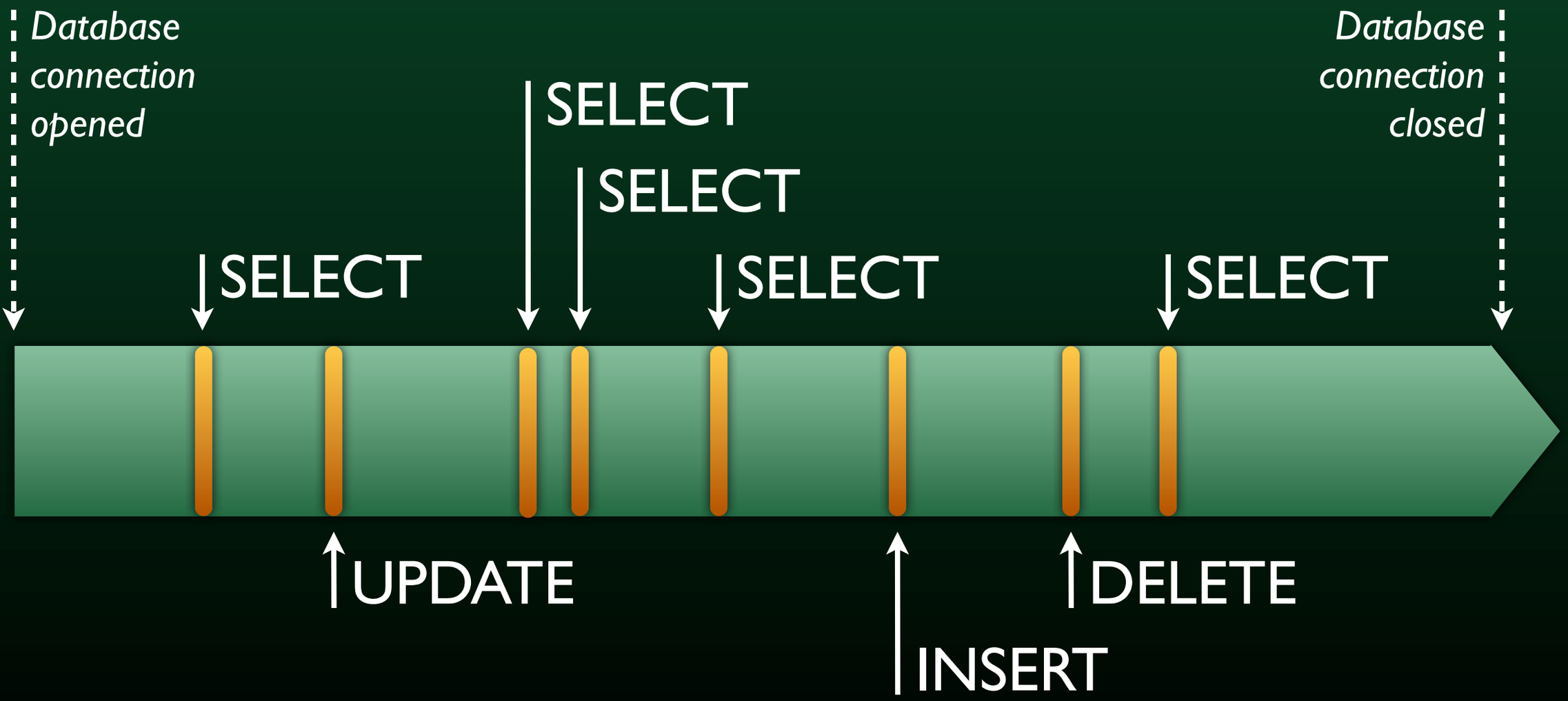
- Tracks the transaction state.
- Parses statements to insert BEGIN or COMMIT:
  - SELECT: —
  - INSERT, UPDATE, DELETE, REPLACE: BEGIN
  - Any other statement: COMMIT
    - Broken by design.
    - “SAVEPOINT foo” triggers a commit!

Django

≥ 1.6

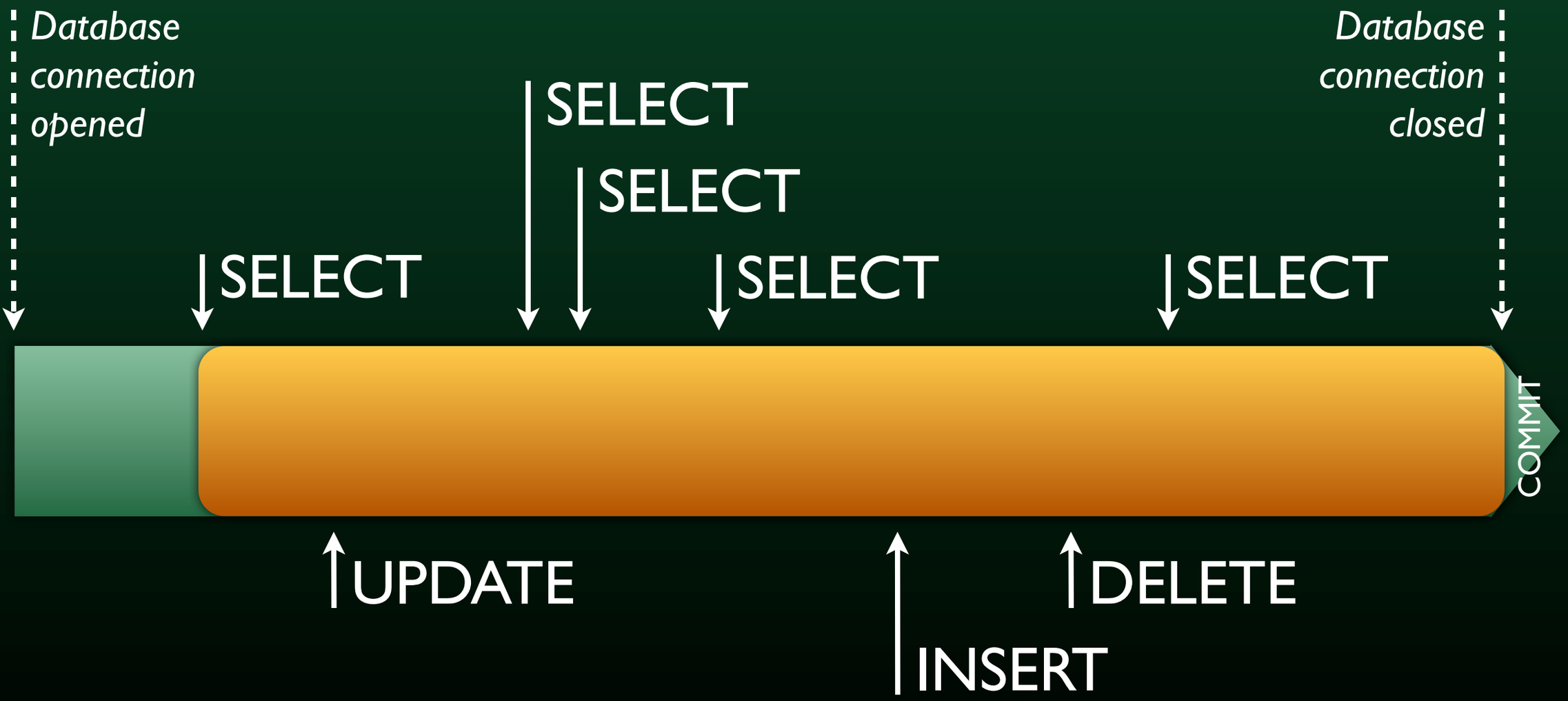


Database-level autocommit



ATOMIC_REQUESTS

One HTTP request = one transaction. Commit on success, roll back on exception.



Per database.

Only for the view function.

High-level API: atomic

- Usable as a decorator or as a context manager.
- Commits on success, rolls back on exceptions.

- Can be nested without any restrictions.
  - Concept stolen from xact by Christophe Pettus.
- Guarantees atomicity.
  - *"Don't Give Users Guns Aimed At Feet"* principle.

Low-level APIs

- Still there in case you're sufficiently masochistic to to implement your own transaction management.

- There aren't many sane ways to combine them.

Thank you!

Questions?

https://docs.djangoproject.com/en/dev/topics/db/transactions/