Assignment 5 Introduction

Version Locking

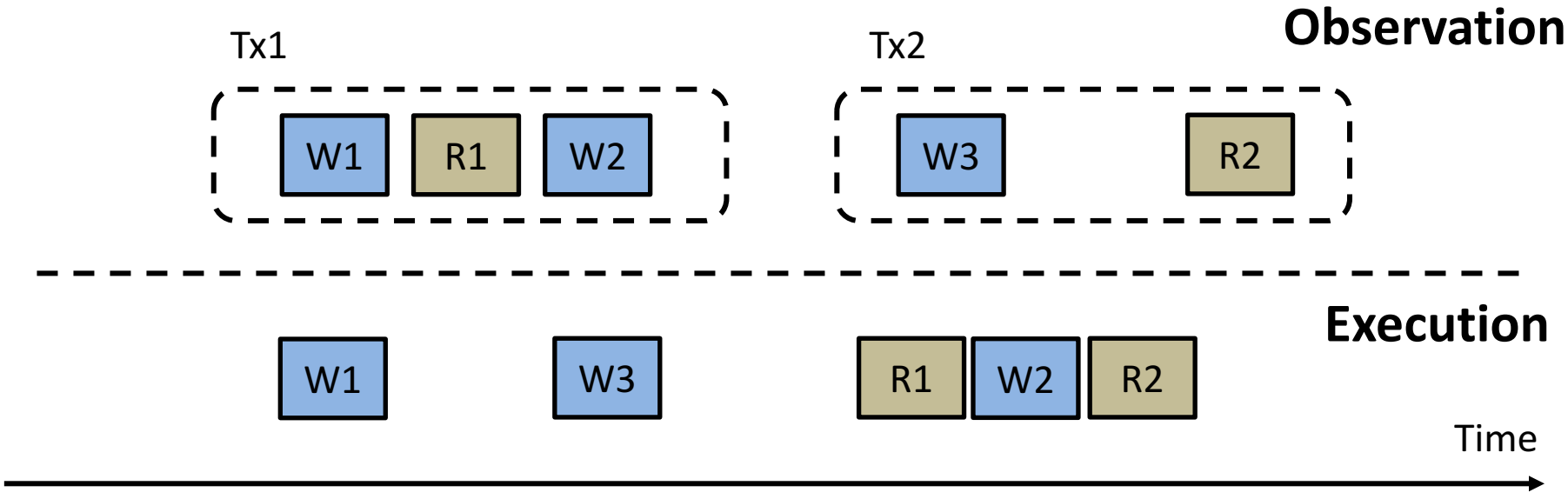
Database Systems

DataLab, CS, NTHU

Spring, 2020

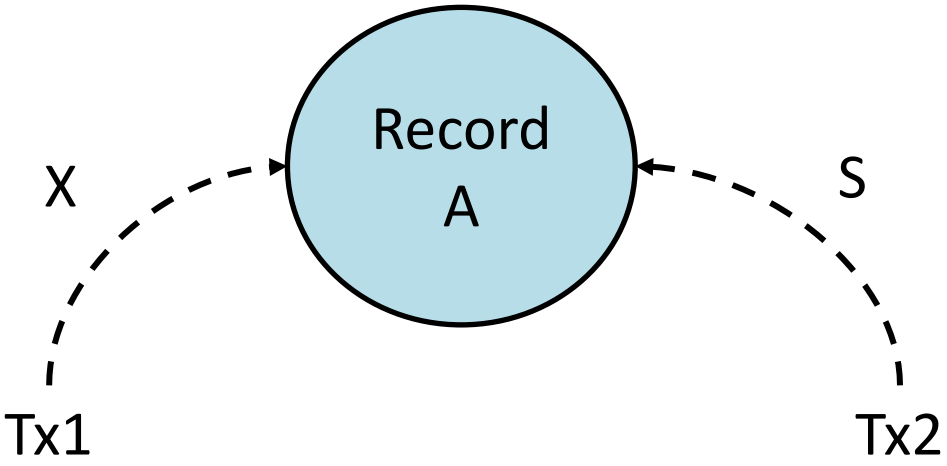
Version Locking

- Version locking is a commonly used concurrency control method
- One main purpose of concurrency control is to make many concurrent txs **seem** to be executed one by one



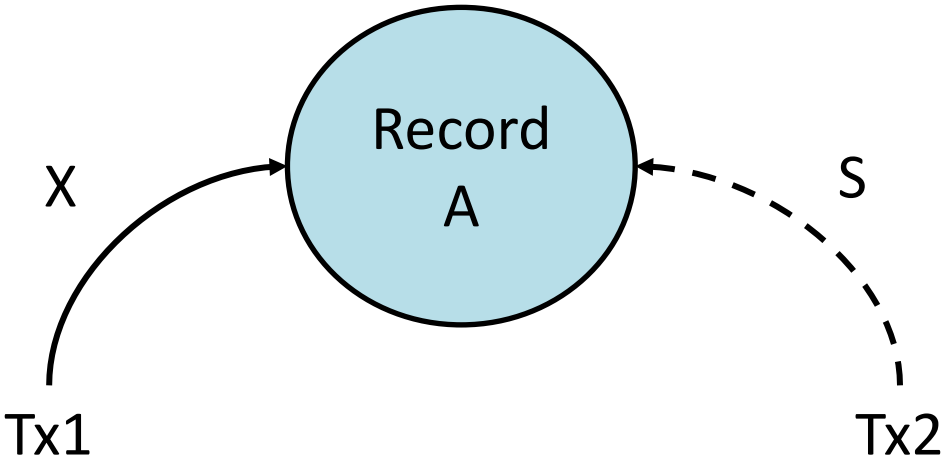
S2PL: Acquire Lock

- Acquire exclusive lock before writing
- Acquire shared lock before reading



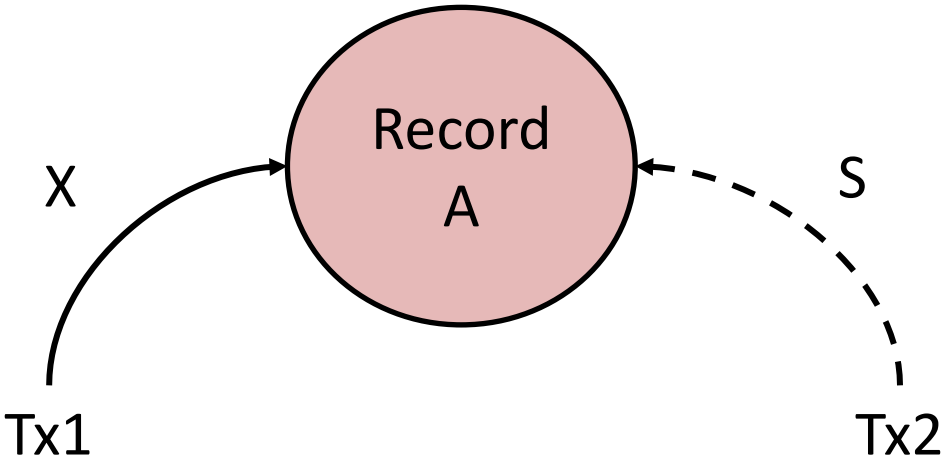
S2PL: Acquire Lock

- Acquire exclusive lock before writing
- Acquire shared lock before reading
- Exclusive locks and shared locks are **incompatible**



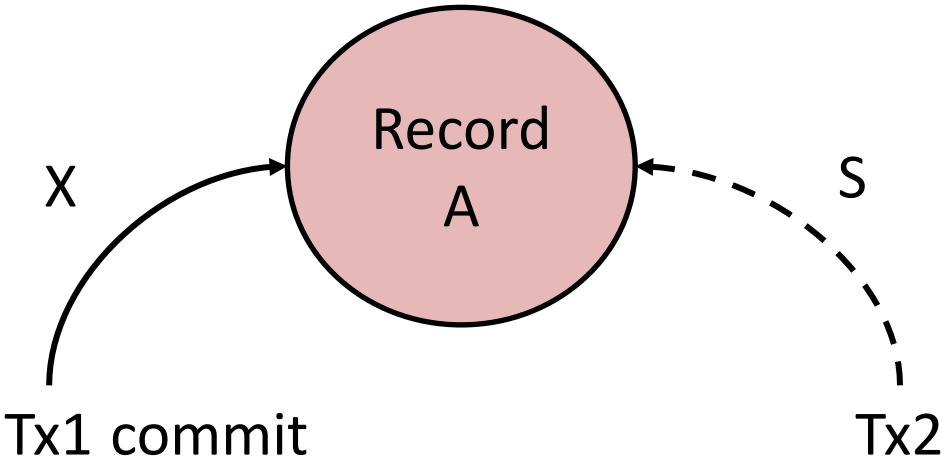
S2PL: Update

- Updates are made **directly to the table**



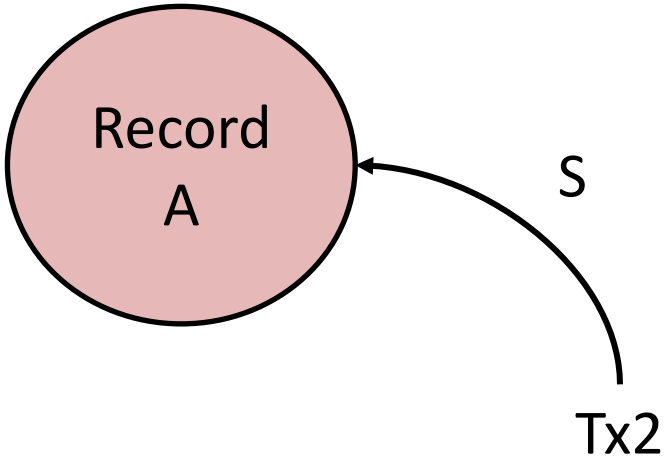
S2PL: Commit

- Release all locks after commit



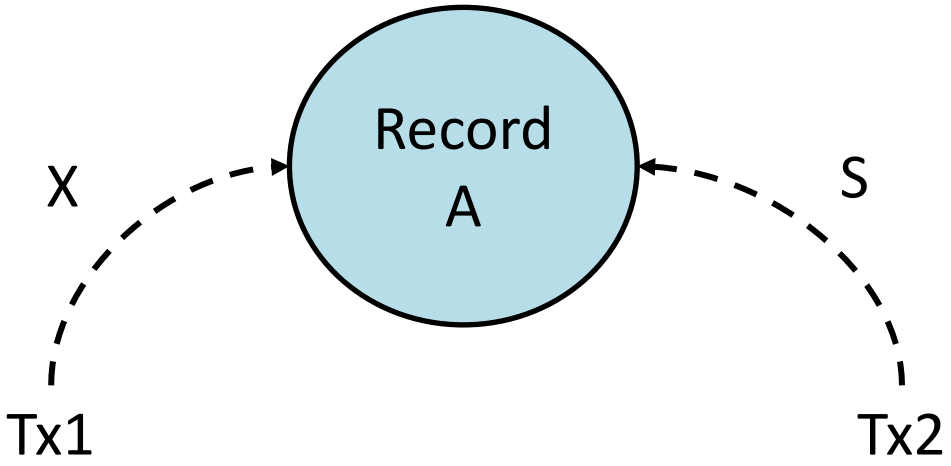
S2PL: Commit

- Release all locks after commit



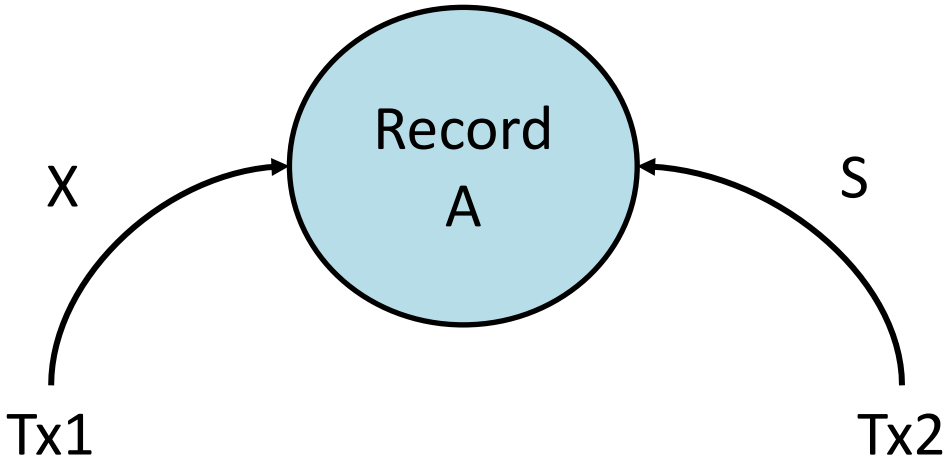
2V2PL: Acquire Lock

- Acquire exclusive lock before writing
- Acquire shared lock before reading



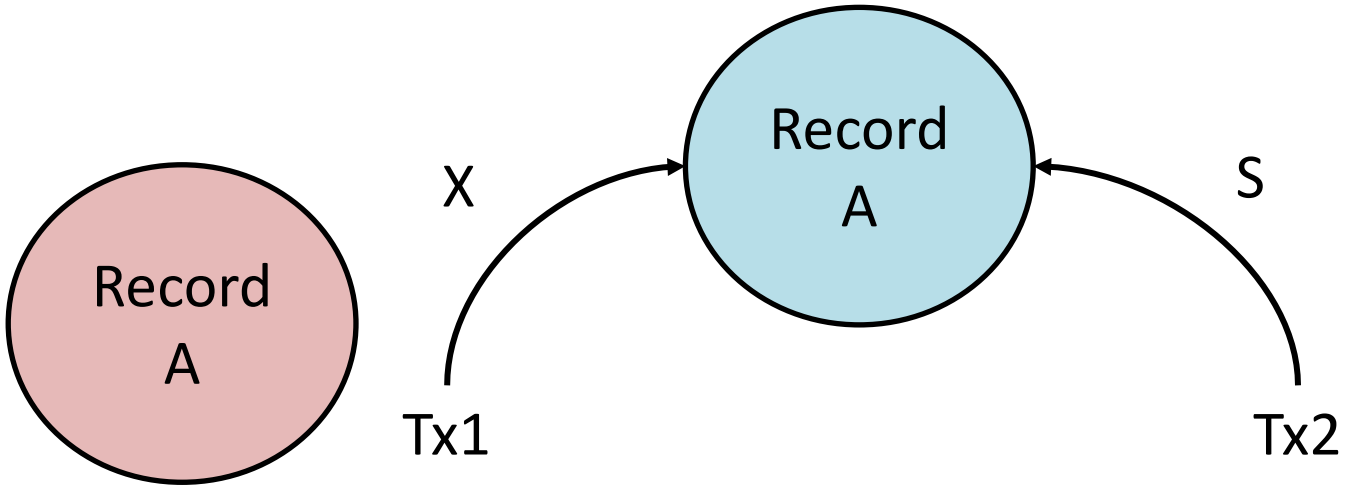
2V2PL: Acquire Lock

- Acquire exclusive lock before writing
- Acquire shared lock before reading
- Exclusive locks and shared locks are **compatible**



2V2PL: Update

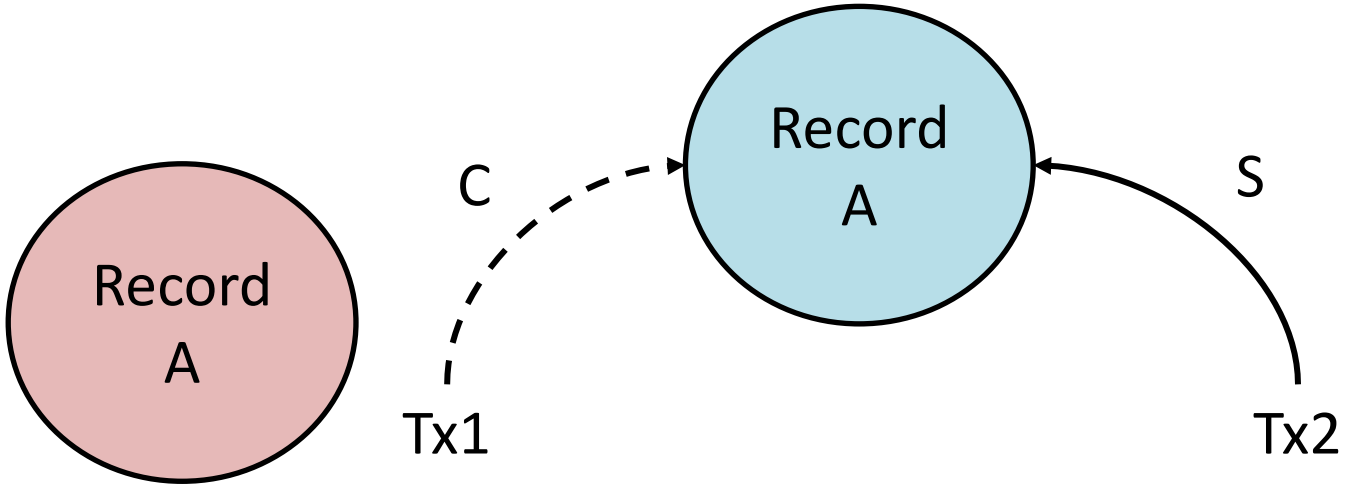
- Updates occur in the **per-transaction private workspace**



Tx1's private workspace

2V2PL: Commit

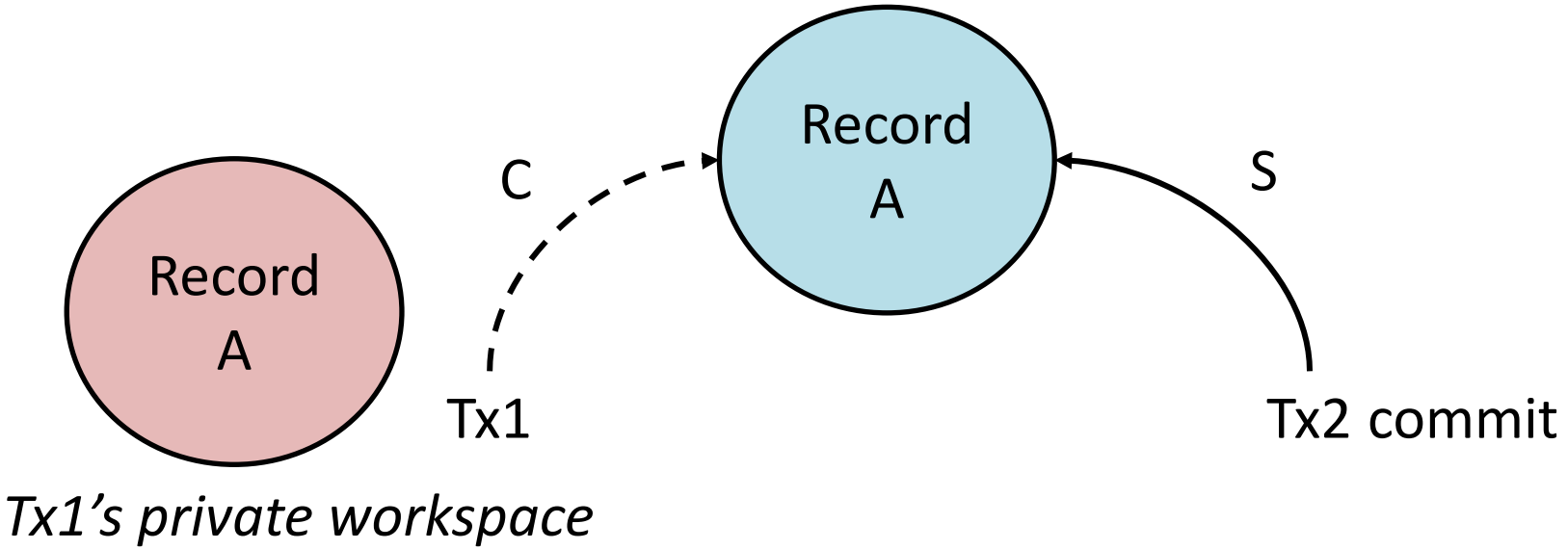
- Before a transaction commits, it needs to acquire a **certify lock** for every record it modified



Tx1's private workspace

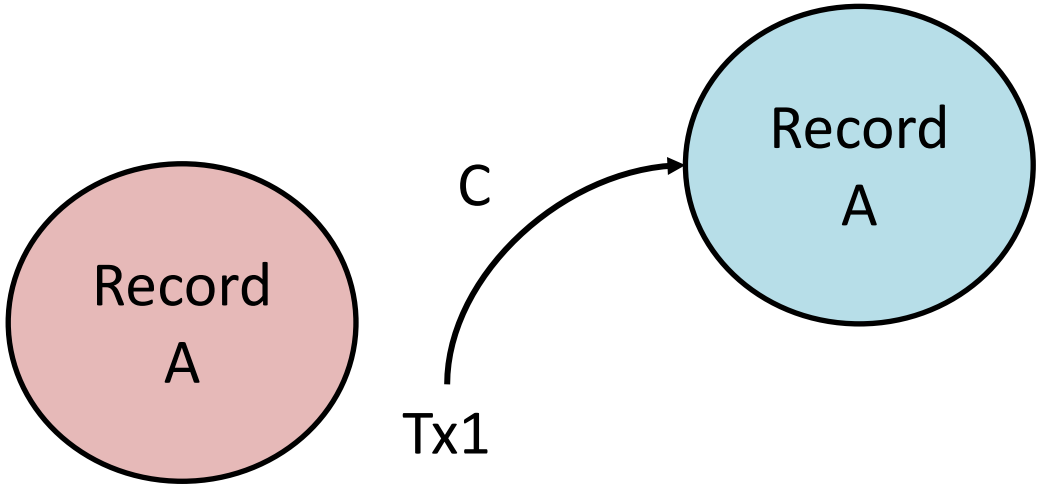
2V2PL: Commit

- Before a transaction commits, it needs to acquire a **certify lock** for every record it modified



2V2PL: Commit

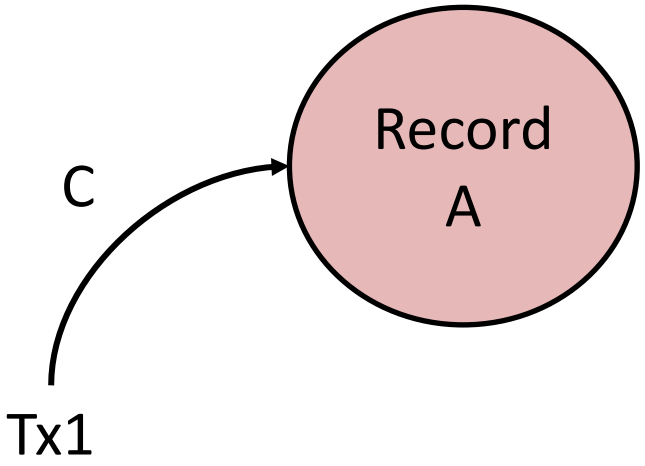
- Before a transaction commits, it needs to acquire a **certify lock** for every record it modified
- After collecting all the required certify locks, the txn copies contents in its private workspace to the table



Tx1's private workspace

2V2PL: Commit

- Before a transaction commits, it needs to acquire a **certify lock** for every record it modified
- After collecting all the required certify locks, the txn copies contents in its private workspace to the table



S2PL vs. 2V2PL

- Lock compatibility
  - S2PL: Exclusive locks and shared locks are incompatible
  - 2V2PL: Exclusive locks and shared locks are compatible
- Updates are made
  - S2PL: Directly to the table
  - 2V2PL: First to the private workspace, then to the table
- Commit
  - S2PL: Release all locks
  - 2V2PL: Acquire certify locks, copy contents from private workspace to the table, and release all locks

Benefit of 2V2PL

- 2V2PL **shrinks** the time of writers blocking readers