CRDTs Illustrated

Link to video

Two kinds of CRDTs!

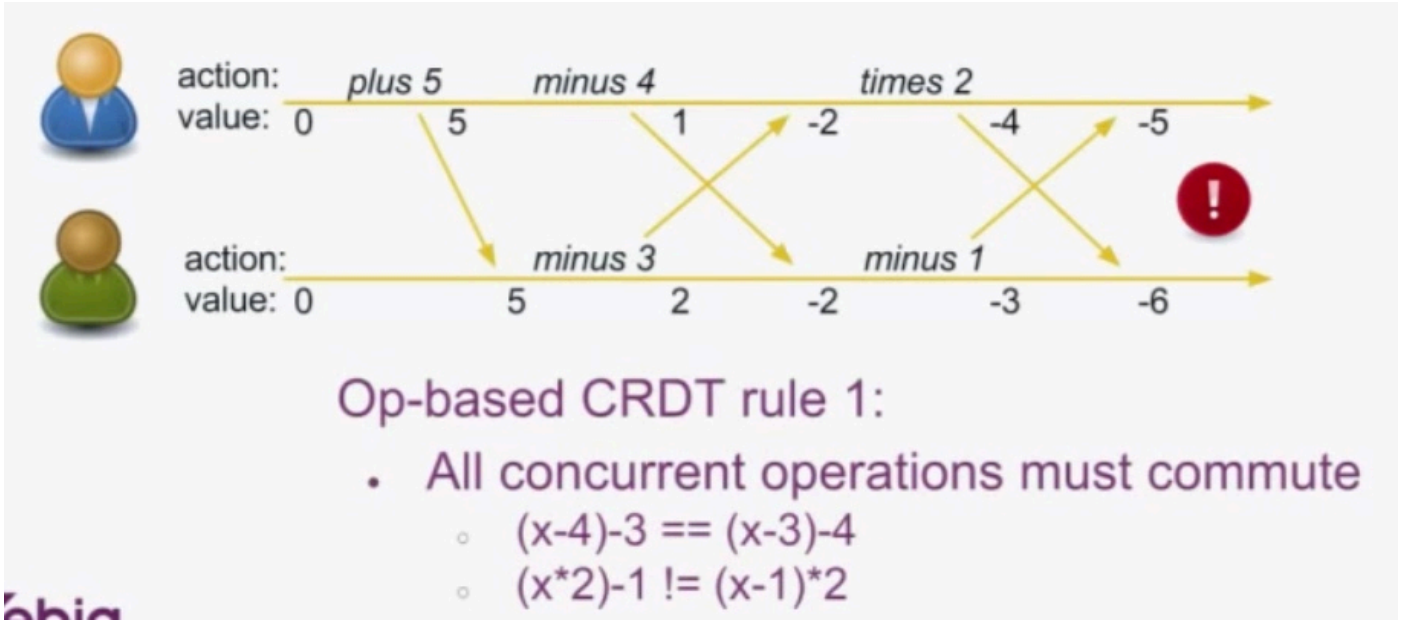
1. **Op-based (CmRDT)** — all ops must be commutative, unique, and in order.
2. **State-based (CvRDT)** — all merges must be idempotent, commutative, associative; partial order among states shold exist, and merge ops should increase along this order

Examples: counters, sets

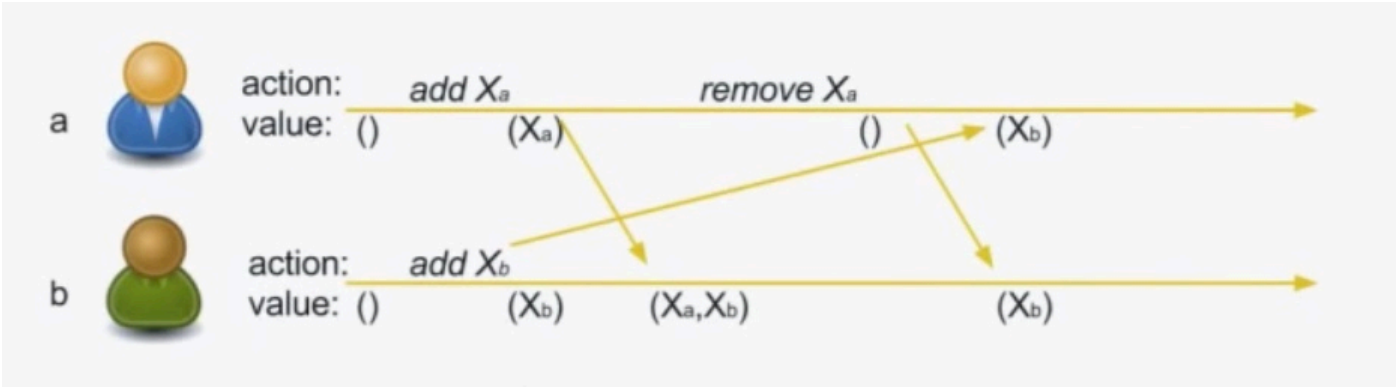
Rules for op-based CRDT:

1. Ops must commute to qualify as a valid CRDT!
2. Ops must be either exactly-once or simply idempotent.
3. Ops must be applied in order.

Commutivity example:



`Observed-remove Set` — add a marker to set elements to help concurrency control.



`State-based` — we need associativity and commutivity for idempotence in these counter examples.

- Use dual counters (positive / negative)
- Version vectors (basically monotonic counter on symbol to perform idempotency over time)