CSE 452

Distributed Systems

Weak Consistency

Weak vs Strong Consistency

Strong = linearizable
(sequential consistency)

"last writer wins"

Why give up on strong consistency?

- different observers see different results (negative)
- performance
- offline operation

aka eventual consistency

Consistency vs Availability tradeoff

Consistency: how linearizable are you?

Availability: how often can clients execute operations?

Paxos: choose consistency at the expense of availability

could choose availability over consistency?

CRDT

conflict-free replicated data type

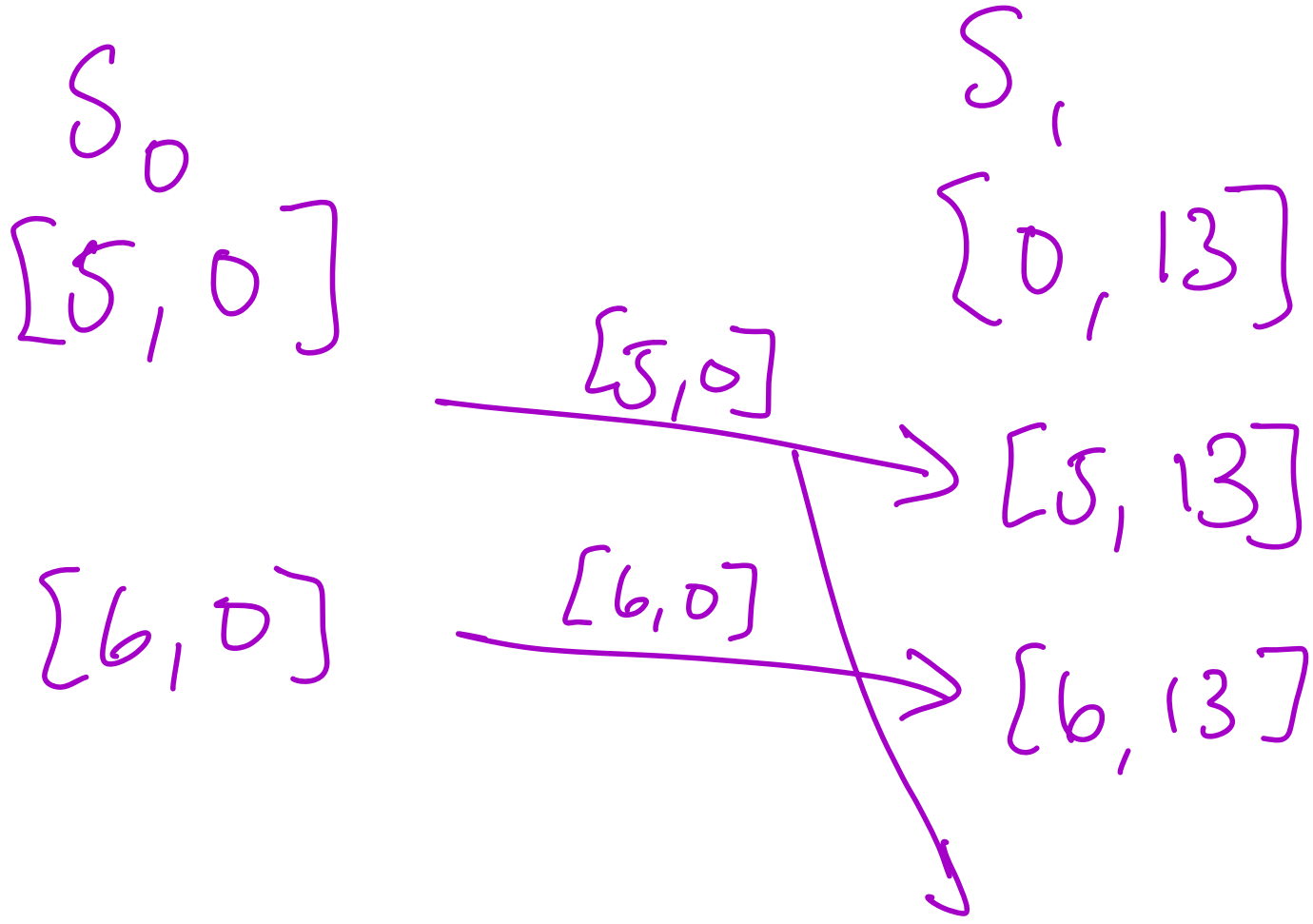
Grow counter: integer starting at 0

increment()

get()

impl:

- array of integers, 1 per server
- server K receives inc(), increment array[K]
- get() sum up all slots in the array



gossip protocol: exchange entire arrays
merge: elementwise maximum

PN Counter

- 2 grow counters
  - 1 for likes
  - 1 for un-likes

- ops
  - increment() — likes.incl()
  - get() ——— likes.get() - unlikes.get()
  - unincrement() — unlikes.incl()
- merge: merge both grow counters