State-based observed-remove set CRDT

Large Scale Distributed Systems

Objectives

Implement a state-based observed-remove set CRDT. Perform replica synchronization by periodically sending state to be merged at other replicas.

Tasks

1. Understand the observed-remove set CRDT (ORSet) from the slides.
2. Write the ORSet CRDT code, with `add` and `remove` state mutators, `elements` query function, and the `join` operator.
3. Write code for the node process that represents each replica. The client API should be in terms of `add`, `remove`, and `read` messages. The latter should use the CRDT `elements` query function, sending the reply in a field named `elements`, while the former two should invoke the respective state mutator.
4. Decide how to synchronize replicas. Add code that makes each node "periodically" send a message with its state to other node(s), and the respective message handler which invokes the join operator.