

MODULE <i>SEC</i>
EXTENDS <i>Naturals</i>
VARIABLES <i>updateset</i> , <i>prev_updateset</i> $SECvars \triangleq \langle updateset, prev_updateset \rangle$
CONSTANTS <i>Replica</i>
$Update \triangleq [r : Replica, seq : Nat]$
$OpUpdate(r) \triangleq updateset[r] \setminus prev_updateset[r]$ for op-based <i>CRDT</i> $StateUpdate(r) \triangleq updateset[r]$ for state-based <i>CRDT</i>
$SECInit \triangleq$ $\wedge updateset = [r \in Replica \mapsto \{\}]$ $\wedge prev_updateset = [r \in Replica \mapsto \{\}]$
$SECUpdate(r, seq) \triangleq$ $\wedge updateset' = [updateset \text{ EXCEPT } ![r] = @ \cup \{[r \mapsto r, seq \mapsto seq]\}]$ $\wedge \text{UNCHANGED } \langle prev_updateset \rangle$
$SECSend(r) \triangleq$ $\wedge prev_updateset' = [prev_updateset \text{ EXCEPT } ![r] = updateset[r]]$ $\wedge \text{UNCHANGED } \langle updateset \rangle$
$SECFlush(r, seq) \triangleq$ $\wedge updateset' = [updateset \text{ EXCEPT } ![r] = @ \cup \{[r \mapsto r, seq \mapsto seq]\}]$ $\wedge prev_updateset' = [prev_updateset \text{ EXCEPT } ![r] = @ \cup \{[r \mapsto r, seq \mapsto seq]\}]$
$SECDeliver(r, m) \triangleq$ $\wedge updateset' = [updateset \text{ EXCEPT } ![r] = @ \cup m.update]$ $\wedge prev_updateset' = [prev_updateset \text{ EXCEPT } ![r] = @ \cup m.update]$
$Sameupdate(r1, r2) \triangleq$ $updateset[r1] = updateset[r2]$

\ * Modification History
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