MODULE CC

EXTENDS TLC, $Sequences$

VARIABLES $Keys$, the set of keys
$Values$ the set of values

$InitVal \triangleq$ CHOOSE $v : v \notin Values$

$Operation \triangleq [op : \{\text{“read”}, \text{“write”}\}, key : Keys, val : Values]$

$R(k, v) \triangleq [op \mapsto \text{“read”}, key \mapsto k, val \mapsto v]$
$W(k, v) \triangleq [op \mapsto \text{“write”}, key \mapsto k, val \mapsto v]$

$Session \triangleq Seq(Operation)$
$History \triangleq$ SUBSET $Session$

Sequential semantics of read-write registers

$Ops(h) \triangleq$ Get all operations of history $h \in History$
FALSE

$CCv(h) \triangleq$ Check whether $h \in History$ satisfies CCv (Causal Convergence)
$\land$ LET $ops \triangleq Ops(h)$
IN $\land \exists\, co \in$ SUBSET $(ops \times ops) :$
$\exists\, arb \in$ SUBSET $(ops \times ops) :$
$\forall\, op \in ops :$ TRUE
$\land$ FALSE