MODULE *StateAWSet*

CONSTANTS
Data the set of data

VARIABLES
aset, *aset*[*r*]: set of active *Instance*(*s*) maintained by $r \in Replica$
tset *tset*[*r*]: set of tombstone *Instance*(*s*) maintained by $r \in Replica$

$Element \triangleq [d : Data,\ r : Replica,\ k : Nat]$ the set of elements

$Network \triangleq$ INSTANCE *BasicNetwork* instance a basic network

$TypeOK \triangleq$
$\land \quad aset \in [Replica \to \text{SUBSET } Element]$
$\land \quad tset \in [Replica \to \text{SUBSET } Element]$

$Init \triangleq \ldots$ initial state

$Send(r) \triangleq \ldots$ $r \in Replica$ send a message
$Receive(r) \triangleq \ldots$ $r \in Replica$ receive a message

$Add(d,\ r) \triangleq \ldots$ $r \in Replica$ add $d \in Data$
$Remove(d,\ r) \triangleq \ldots$ $r \in Replica$ remove $d \in Data$

$Do(r) \triangleq$ operations
$\exists\, d \in Data : Add(d,\ r) \lor Remove(d,\ r)$

$Next \triangleq$ next-state relation
$\exists\, r \in Replica : Receive(r) \lor Send(r) \lor Do(r)$

$Spec \triangleq Init \land \Box[Next]_{vars}$ specification

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$Add(d,\ r) \triangleq$ $r \in Replica$ add $d \in Data$
$aset' = [aset \text{ EXCEPT } ![r] = @ \cup \{[d \mapsto d,\ r \mapsto r,\ k \mapsto seq[r]]\}]$

$Remove(d,\ r) \triangleq$ $r \in Replica$ remove $d \in Data$
LET $E \triangleq \{ele \in aset[r] : ele.d = d\}$
IN $\land\ aset' = [aset \text{ EXCEPT } ![r] = @ \setminus E]$
$\land\ tset' = [tset \text{ EXCEPT } ![r] = @ \cup E]$

$Read(r) \triangleq$ read the state of $r \in Replica$
$\{ele.d : ele \in aset[r]\}$

$Do(r) \triangleq$ operations
$\exists\, a \in Data : Add(a,\ r) \lor Remove(a,\ r)$

$Send(r) \triangleq$ $r \in Replica$ send a message

$Network!NBroadcast(r,\ [r \mapsto r,\ seq \mapsto seq[r],\ update \mapsto StateUpdate(r),\ A \mapsto aset[r],\ T \mapsto tset[r]])$

$Receive(r) \triangleq$ $r \in Replica$ receive a message

$\land\ Network!NDeliver(r)$

$\land\ tset' = [tset \text{ EXCEPT } ![r] = @ \cup lmsg'.T]$

$\land\ aset' = [aset \text{ EXCEPT } ![r] = (@ \cup lmsg'.A) \setminus tset'[r]]$

* Modification History

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