MODULE *Configurations*

EXTENDS *Southbound*

INSTANCE *Naturals*

INSTANCE *FiniteSets*

LOCAL INSTANCE *TLC*

Status constants

CONSTANTS

ConfigurationInProgress,
ConfigurationComplete,
ConfigurationFailed

A record of per-target configurations

VARIABLE *configuration*

LOCAL *InitState* $\triangleq$
$[configurations \mapsto configuration,$
$\ targets \mapsto target,$
$\ masterships \mapsto mastership]$

LOCAL *NextState* $\triangleq$
$[configurations \mapsto configuration',$
$\ targets \mapsto target',$
$\ masterships \mapsto mastership']$

LOCAL *Trace* $\triangleq$ INSTANCE *Trace* WITH
Module $\leftarrow$ "Configurations",
InitState $\leftarrow$ *InitState*,
NextState $\leftarrow$ *NextState*

This section models the Configuration reconciler.

$ReconcileConfiguration(n,\ t) \triangleq$
$\land \lor \land Target[t].persistent$
$\land configuration[t].state \neq ConfigurationComplete$
$\land configuration' = [configuration \text{ EXCEPT } ![t].state = ConfigurationComplete]$
$\land \text{UNCHANGED } \langle target \rangle$
$\lor \land \neg Target[t].persistent$
$\land \lor mastership[t].term > configuration[t].committed.term$
$\lor \land mastership[t].term = configuration[t].committed.term$

$$
\begin{array}{l}
\quad \land\ mastership[t].master = Nil \\
\land\ configuration' = [configuration\ \text{EXCEPT}\ ![t].committed.term = mastership[t].term, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad ![t].state\ \ = ConfigurationInProgress] \\
\land\ \text{UNCHANGED}\ \langle target \rangle \\
\lor\ \land\ configuration[t].state = ConfigurationInProgress \\
\quad \land\ mastership[t].term = configuration[t].committed.term \\
\quad \land\ mastership[t].master = n \\
\quad \land\ target' = [target\ \text{EXCEPT}\ ![t] = configuration[t].applied.values] \\
\quad \land\ configuration' = [configuration\ \text{EXCEPT}\ ![t].applied.term = mastership[t].term, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad ![t].state\ \ = ConfigurationComplete] \\
\land\ \text{UNCHANGED}\ \langle mastership \rangle
\end{array}
$$

Formal specification, constraints, and theorems.

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\begin{array}{l}
InitConfiguration\ \triangleq \\
\quad \land\ configuration = [t \in \text{DOMAIN}\ Target \mapsto \\
\qquad\qquad\qquad\qquad [state\ \ \mapsto ConfigurationInProgress, \\
\qquad\qquad\qquad\qquad\ index\ \ \ \ \mapsto 0, \\
\qquad\qquad\qquad\qquad\ committed \mapsto \\
\qquad\qquad\qquad\qquad\quad [index\ \ \mapsto 0, \\
\qquad\qquad\qquad\qquad\quad\ term\ \ \ \mapsto 0, \\
\qquad\qquad\qquad\qquad\quad\ values\ \ \mapsto \\
\qquad\qquad\qquad\qquad\qquad\ [path \in \{\} \mapsto \\
\qquad\qquad\qquad\qquad\qquad\quad [path\ \ \ \mapsto path, \\
\qquad\qquad\qquad\qquad\qquad\quad\ value\ \ \mapsto Nil, \\
\qquad\qquad\qquad\qquad\qquad\quad\ index\ \ \mapsto 0, \\
\qquad\qquad\qquad\qquad\qquad\quad\ deleted \mapsto \text{FALSE}]]], \\
\qquad\qquad\qquad\qquad proposed\ \mapsto [index \mapsto 0], \\
\qquad\qquad\qquad\qquad applied\ \ \mapsto \\
\qquad\qquad\qquad\qquad\quad [index\ \ \mapsto 0, \\
\qquad\qquad\qquad\qquad\quad\ term\ \ \ \mapsto 0, \\
\qquad\qquad\qquad\qquad\quad\ values\ \ \mapsto \\
\qquad\qquad\qquad\qquad\qquad\ [path \in \{\} \mapsto \\
\qquad\qquad\qquad\qquad\qquad\quad [path\ \ \ \mapsto path, \\
\qquad\qquad\qquad\qquad\qquad\quad\ value\ \ \mapsto Nil, \\
\qquad\qquad\qquad\qquad\qquad\quad\ index\ \ \mapsto 0, \\
\qquad\qquad\qquad\qquad\qquad\quad\ deleted \mapsto \text{FALSE}]]]]] \\
\quad \land\ Trace!Init
\end{array}
$$

$$
\begin{array}{l}
NextConfiguration\ \triangleq \\
\quad \lor \exists\, n \in Node : \\
\qquad \exists\, t \in \text{DOMAIN}\ configuration : \\
\qquad\quad Trace!Step(\text{“Reconcile”},\ ReconcileConfiguration(n,\ t),\ [node \mapsto n,\ target \mapsto t])
\end{array}
$$

\ * Modification History
\ * Last modified *Fri Apr* 21 12:46:55 *PDT* 2023 by *jhalterm*
\ * Last modified Sun *Feb* 20 10:07:49 *PST* 2022 by *jordanhalterman*
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