MODULE *Configuration*

EXTENDS *Mastership*

INSTANCE *Naturals*

INSTANCE *FiniteSets*

LOCAL INSTANCE *TLC*

Status constants

CONSTANTS
ConfigurationInProgress,
ConfigurationComplete,
ConfigurationFailed

CONSTANT *LogConfiguration*

ASSUME *LogConfiguration* $\in$ BOOLEAN

A record of per-target configurations

VARIABLE *configuration*

LOCAL *CurrentState* $\triangleq$
$[$*configuration* $\mapsto$ *configuration*,
target $\mapsto$ *target*,
mastership $\mapsto$ *mastership*,
nodes $\mapsto$ *node*$]$

LOCAL *SuccessorState* $\triangleq$
$[$*configuration* $\mapsto$ *configuration*$'$,
target $\mapsto$ *target*$'$,
mastership $\mapsto$ *mastership*$'$,
nodes $\mapsto$ *node*$'$$]$

LOCAL *Log* $\triangleq$ INSTANCE *Log* WITH
File $\leftarrow$ "Configuration.log",
CurrentState $\leftarrow$ *CurrentState*,
SuccessorState $\leftarrow$ *SuccessorState*,
Enabled $\leftarrow$ *LogConfiguration*

This section models the *Configuration* reconciler.

ReconcileConfiguration(n) $\triangleq$
$\land$ *mastership.master* $= n$

$$
\begin{array}{l}
\land\ \lor\ \land\ configuration.status \neq ConfigurationInProgress \\
\qquad\ \land\ configuration.apply.term < mastership.term \\
\qquad\ \land\ configuration' = [configuration\ \text{EXCEPT}\ !.status = ConfigurationInProgress] \\
\qquad\ \land\ \text{UNCHANGED}\ \langle target \rangle \\
\qquad\ \lor\ \land\ configuration.status = ConfigurationInProgress \\
\qquad\ \land\ configuration.apply.term < mastership.term \\
\qquad\ \land\ node[n].connected \\
\qquad\ \land\ target.running \\
\qquad\ \land\ target' = [target\ \text{EXCEPT}\ !.values = configuration.apply.values] \\
\qquad\ \land\ configuration' = [configuration\ \text{EXCEPT}\ !.apply.term\ \ = mastership.term, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\ !.apply.target\ = target.incarnation, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\ !.status\qquad\ = ConfigurationComplete] \\
\land\ \text{UNCHANGED}\ \langle mastership,\ node \rangle
\end{array}
$$

Formal specification, constraints, and theorems.

$$
\begin{array}{l}
InitConfiguration\ \triangleq \\
\quad \land\ Log!Init \\
\quad \land\ configuration = [\\
\qquad\ status\ \ \mapsto ConfigurationInProgress, \\
\qquad\ commit \mapsto [\\
\qquad\quad\ proposal \mapsto 0, \\
\qquad\quad\ index\ \ \ \mapsto 0, \\
\qquad\quad\ term\ \ \ \ \mapsto 0, \\
\qquad\quad\ values\ \ \mapsto [\\
\qquad\qquad\ path \in \{\} \mapsto [\\
\qquad\qquad\quad\ index \mapsto 0, \\
\qquad\qquad\quad\ value \mapsto Nil]]], \\
\qquad\ apply\ \ \mapsto [\\
\qquad\quad\ proposal \mapsto 0, \\
\qquad\quad\ index\ \ \ \mapsto 0, \\
\qquad\quad\ term\ \ \ \ \mapsto 0, \\
\qquad\quad\ target\ \ \ \mapsto 0, \\
\qquad\quad\ values\ \ \mapsto [\\
\qquad\qquad\ path \in \{\} \mapsto [\\
\qquad\qquad\quad\ index \mapsto 0, \\
\qquad\qquad\quad\ value \mapsto Nil]]]]
\end{array}
$$

$$
\begin{array}{l}
NextConfiguration\ \triangleq \\
\quad \lor\ \exists\, n \in Nodes : \\
\qquad\ Log!Action(ReconcileConfiguration(n),\ [node \mapsto n])
\end{array}
$$

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* Modification History
* Last modified *Fri Apr* 21 12:46:55 *PDT* 2023 by *jhalterm*

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