MODULE *Northbound*

EXTENDS *Proposal*

INSTANCE *Naturals*

INSTANCE *FiniteSets*

INSTANCE *Sequences*

LOCAL INSTANCE *TLC*

CONSTANT *Changes*

Add change 'c' to the proposal log

$$
\begin{array}{l}
Change(i) \triangleq \\
\quad \land \quad proposal[i].state = Nil \\
\quad \land \quad i - 1 \in \text{DOMAIN } proposal \Rightarrow proposal[i-1].state \neq Nil \\
\quad \land \quad \exists\, c \in Changes : \\
\qquad \land\, proposal' = [proposal \text{ EXCEPT } ![i] = [state \quad \mapsto ProposalChange, \\
\qquad\qquad\qquad\qquad\qquad\qquad\quad change \quad \mapsto [\\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad values \mapsto [p \in \text{DOMAIN } c \mapsto [value \mapsto c[p]]], \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad phase \;\mapsto ProposalCommit, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad status \mapsto ProposalPending], \\
\qquad\qquad\qquad\qquad\qquad\qquad\quad rollback \mapsto [\\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad revision \mapsto 0, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad phase \;\;\mapsto Nil, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad status \;\mapsto Nil, \\
\qquad\qquad\qquad\qquad\qquad\qquad\qquad values \;\mapsto [p \in \{\} \mapsto [value \mapsto Nil]]]]] \\
\quad \land \quad \text{UNCHANGED } \langle configuration, mastership, node, target \rangle
\end{array}
$$

Add a rollback of proposal 'i' to the proposal log

$$
\begin{array}{l}
Rollback(i) \triangleq \\
\quad \land\, proposal[i].state = ProposalChange \\
\quad \land\, proposal' = [proposal \text{ EXCEPT } ![i].state \quad\quad\quad\quad = ProposalRollback, \\
\qquad\qquad\qquad\qquad\qquad\qquad\quad ![i].rollback.phase \;= ProposalCommit, \\
\qquad\qquad\qquad\qquad\qquad\qquad\quad ![i].rollback.status = ProposalPending] \\
\quad \land \text{UNCHANGED } \langle configuration, mastership, node, target \rangle
\end{array}
$$

Formal specification, constraints, and theorems.

$$InitNorthbound \triangleq \text{TRUE}$$

$$
\begin{array}{l}
NextNorthbound \triangleq \\
\quad \exists\, i \in 1 \,..\, NumProposals : \\
\qquad \lor\, Change(i)
\end{array}
$$

$\lor\ Rollback(i)$

ASSUME $\forall\, c \in Changes :$
$\land\ Cardinality(\text{DOMAIN } c) > 0$
$\land \forall\, p \in \text{DOMAIN } c : c[p] \in \text{STRING}$

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* Modification History
* Last modified *Fri Apr* 21 16:42:15 *PDT* 2023 by *jhalterm*
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