
MODULE *Southbound*

INSTANCE *Naturals*

INSTANCE *FiniteSets*

LOCAL INSTANCE *TLC*

An empty constant
CONSTANT *Nil*

A record of target states
VARIABLE *target*

The set of all nodes
CONSTANT *Nodes*

The state of nodes
VARIABLE *node*

This section models node and target states.

Start \triangleq

$$\begin{aligned} &\wedge \neg target.running \\ &\wedge target' = [target \text{ EXCEPT } !.incarnation = target.incarnation + 1, \\ &\hspace{15em} !.running = \text{TRUE}] \\ &\wedge \text{UNCHANGED } \langle node \rangle \end{aligned}$$

Stop \triangleq

$$\begin{aligned} &\wedge target.running \\ &\wedge target' = [target \text{ EXCEPT } !.running = \text{FALSE}, \\ &\hspace{15em} !.values = [p \in \{\} \mapsto [value \mapsto Nil]]] \\ &\wedge \text{UNCHANGED } \langle node \rangle \end{aligned}$$

Connect(*n*) \triangleq

$$\begin{aligned} &\wedge \neg node[n].connected \\ &\wedge target.running \\ &\wedge node' = [node \text{ EXCEPT } ![n].target = target.incarnation, \\ &\hspace{15em} ![n].incarnation = node[n].incarnation + 1, \\ &\hspace{15em} ![n].connected = \text{TRUE}] \\ &\wedge \text{UNCHANGED } \langle target \rangle \end{aligned}$$

Disconnect(*n*) \triangleq

$$\begin{aligned} &\wedge node[n].connected \\ &\wedge node' = [node \text{ EXCEPT } ![n].connected = \text{FALSE}] \\ &\wedge \text{UNCHANGED } \langle target \rangle \end{aligned}$$

$InitSouthbound \triangleq$
 $\wedge target = [incarnation \mapsto 0,$
 $\quad \quad \quad running \mapsto FALSE,$
 $\quad \quad \quad values \mapsto [p \in \{\} \mapsto [value \mapsto Nil]]]$
 $\wedge node = [n \in Nodes \mapsto [target \mapsto 0, incarnation \mapsto 0, connected \mapsto FALSE]]$

$NextSouthbound \triangleq$
 $\vee Start$
 $\vee Stop$
 $\vee \exists n \in Nodes : Connect(n)$
 $\vee \exists n \in Nodes : Disconnect(n)$

ASSUME $\wedge IsFiniteSet(Nodes)$
 $\wedge \forall n \in Nodes :$
 $\quad \wedge n \in STRING$

\backslash * Modification History
 \backslash * Last modified Sun Feb 20 09:09:52 PST 2022 by jordanhalterman
 \backslash * Created Sun Feb 20 03:13:26 PST 2022 by jordanhalterman