
MODULE *Configurations*

EXTENDS *Mastership*

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*) \triangleq

\wedge *mastership.master* = *n*

$\wedge \vee \wedge$ *configuration.state* \neq *ConfigurationInProgress*

\wedge *configuration.applied.term* < *mastership.term*

\wedge *configuration'* = [*configuration* EXCEPT !.state = *ConfigurationInProgress*]

\wedge UNCHANGED \langle *target* \rangle

$\vee \wedge$ *configuration.state* = *ConfigurationInProgress*

\wedge *configuration.applied.term* < *mastership.term*

$$\begin{aligned}
& \wedge \text{conn}[n].\text{state} = \text{Connected} \\
& \wedge \text{target}.\text{state} = \text{Alive} \\
& \wedge \text{target}' = [\text{target} \text{ EXCEPT } !.\text{values} = \text{configuration.applied.values}] \\
& \wedge \text{configuration}' = [\text{configuration} \text{ EXCEPT } !.\text{applied.term} = \text{mastership.term}, \\
& \hspace{15em} !.\text{state} = \text{ConfigurationComplete}] \\
& \wedge \text{UNCHANGED } \langle \text{mastership}, \text{conn} \rangle
\end{aligned}$$

Formal specification, constraints, and theorems.

InitConfiguration \triangleq

$$\begin{aligned}
& \wedge \text{configuration} = [\\
& \quad \text{state} \mapsto \text{ConfigurationInProgress}, \\
& \quad \text{index} \mapsto 0, \\
& \quad \text{committed} \mapsto [\\
& \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \text{term} \mapsto 0, \\
& \quad \quad \text{values} \mapsto [\\
& \quad \quad \quad \text{path} \in \{\} \mapsto [\\
& \quad \quad \quad \quad \text{path} \mapsto \text{path}, \\
& \quad \quad \quad \quad \text{value} \mapsto \text{Nil}, \\
& \quad \quad \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \quad \quad \text{deleted} \mapsto \text{FALSE}]]], \\
& \quad \text{proposed} \mapsto [\text{index} \mapsto 0], \\
& \quad \text{applied} \mapsto [\\
& \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \text{term} \mapsto 0, \\
& \quad \quad \text{values} \mapsto [\\
& \quad \quad \quad \text{path} \in \{\} \mapsto [\\
& \quad \quad \quad \quad \text{path} \mapsto \text{path}, \\
& \quad \quad \quad \quad \text{value} \mapsto \text{Nil}, \\
& \quad \quad \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \quad \quad \text{deleted} \mapsto \text{FALSE}]]]] \\
& \wedge \text{Trace!Init}
\end{aligned}$$

NextConfiguration \triangleq

$$\begin{aligned}
& \vee \exists n \in \text{Node} : \\
& \quad \text{Trace!Step}(\text{ReconcileConfiguration}(n), [\text{node} \mapsto n])
\end{aligned}$$

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