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MODULE *Configuration*

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EXTENDS *Mastership*

INSTANCE *Naturals*

INSTANCE *FiniteSets*

LOCAL INSTANCE *TLC*

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Status constants

CONSTANTS

*ConfigurationInProgress*,  
*ConfigurationComplete*,  
*ConfigurationFailed*

CONSTANT *TraceConfiguration*

A record of per-target configurations

VARIABLE *configuration*

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LOCAL *InitState*  $\triangleq$

[*configurations*  $\mapsto$  *configuration*,  
*targets*  $\mapsto$  *target*,  
*masterships*  $\mapsto$  *mastership*,  
*nodes*  $\mapsto$  *node*]

LOCAL *NextState*  $\triangleq$

[*configurations*  $\mapsto$  *configuration'*,  
*targets*  $\mapsto$  *target'*,  
*masterships*  $\mapsto$  *mastership'*,  
*nodes*  $\mapsto$  *node'*]

LOCAL *Trace*  $\triangleq$  INSTANCE *Trace* WITH

*Module*  $\leftarrow$  "Configurations",  
*InitState*  $\leftarrow$  *InitState*,  
*NextState*  $\leftarrow$  *NextState*,  
*Enabled*  $\leftarrow$  *TraceConfiguration*

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This section models the *Configuration* reconciler.

*ReconcileConfiguration*(*n*)  $\triangleq$

$\wedge$  *mastership.master* = *n*  
 $\wedge \vee \wedge$  *configuration.state*  $\neq$  *ConfigurationInProgress*

$$\begin{aligned}
& \wedge \text{configuration.applied.term} < \text{mastership.term} \\
& \wedge \text{configuration}' = [\text{configuration} \text{ EXCEPT } !.state = \text{ConfigurationInProgress}] \\
& \wedge \text{UNCHANGED } \langle \text{target} \rangle \\
\vee & \wedge \text{configuration.state} = \text{ConfigurationInProgress} \\
& \wedge \text{configuration.applied.term} < \text{mastership.term} \\
& \wedge \text{node}[n].\text{connected} \\
& \wedge \text{target.running} \\
& \wedge \text{target}' = [\text{target} \text{ EXCEPT } !.values = \text{configuration.applied.values}] \\
& \wedge \text{configuration}' = [\text{configuration} \text{ EXCEPT } !.applied.term = \text{mastership.term}, \\
& \hspace{15em} !.state = \text{ConfigurationComplete}] \\
& \wedge \text{UNCHANGED } \langle \text{mastership}, \text{node} \rangle
\end{aligned}$$


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Formal specification, constraints, and theorems.

$$\begin{aligned}
\text{InitConfiguration} & \triangleq \\
& \wedge \text{configuration} = [ \\
& \quad \text{state} \mapsto \text{ConfigurationInProgress}, \\
& \quad \text{committed} \mapsto [ \\
& \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \text{revision} \mapsto 0, \\
& \quad \quad \text{term} \mapsto 0, \\
& \quad \quad \text{values} \mapsto [ \\
& \quad \quad \quad \text{path} \in \{\} \mapsto [ \\
& \quad \quad \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \quad \quad \text{value} \mapsto \text{Nil}]]], \\
& \quad \text{applied} \mapsto [ \\
& \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \text{revision} \mapsto 0, \\
& \quad \quad \text{term} \mapsto 0, \\
& \quad \quad \text{values} \mapsto [ \\
& \quad \quad \quad \text{path} \in \{\} \mapsto [ \\
& \quad \quad \quad \quad \text{index} \mapsto 0, \\
& \quad \quad \quad \quad \text{value} \mapsto \text{Nil}]]]] \\
& \wedge \text{Trace!Init} \\
\text{NextConfiguration} & \triangleq \\
& \vee \exists n \in \text{Nodes} : \\
& \quad \text{Trace!Step}(\text{ReconcileConfiguration}(n), [\text{node} \mapsto n])
\end{aligned}$$


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\\* 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*  
\\* Created *Sun Feb 20 10:06:55 PST 2022* by *jordanhalterman*