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— Module Configuration -
EXTENDS Mastership
INSTANCE Naturals
INSTANCE FiniteSets
LOCAL INSTANCE TLC
 Status constants
CONSTANTS
   Configuration In Progress,\\
   Configuration Complete,
   Configuration Failed \\
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
\texttt{LOCAL} \ \textit{SuccessorState} \ \triangleq \\
   [configuration \mapsto configuration',
    target
                    \mapsto target',
    mastership
                    \mapsto mastership',
    nodes
                    \mapsto node'
LOCAL Log \stackrel{\triangle}{=} \text{INSTANCE } Log \text{ WITH}
                     \leftarrow "Configuration.log",
   CurrentState \leftarrow CurrentState,
   SuccessorState \leftarrow SuccessorState,
                     \leftarrow LogConfiguration
   Enabled
This section models the Configuration reconciler.
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 $ReconcileConfiguration(n) \triangleq \land mastership.master = n$

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\land \ \lor \ \land \ configuration.state \neq ConfigurationInProgress
          \land \ configuration.apply.term < mastership.term
          \land configuration' = [configuration EXCEPT !.state = ConfigurationInProgress]
          \land UNCHANGED \langle target \rangle
       \lor \land configuration.state = ConfigurationInProgress
          \land \ configuration.apply.term < mastership.term
          \land node[n].connected
          \land target.running
          \land target' = [target \ EXCEPT \ !.values = configuration.apply.values]
          \land configuration' = [configuration EXCEPT !.apply.term = mastership.term,
                                                             !.apply.target = target.incarnation,
                                                                               = ConfigurationComplete
                                                             !.state
   \land UNCHANGED \langle mastership, node \rangle
Formal specification, constraints, and theorems.
InitConfiguration \triangleq
   \land Log!Init
   \land configuration = [
                   \mapsto ConfigurationInProgress,
          state
          commit \mapsto [
             proposal \mapsto 0,
             index
                      \mapsto 0,
             term
                        \mapsto 0,
             values
                      \mapsto [
                 path \in \{\} \mapsto [
                    index \mapsto 0,
                    value \mapsto Nil]],
          apply \mapsto [
             proposal \mapsto 0,
             index
                      \mapsto 0,
             term
                        \mapsto 0,
             target \mapsto 0,
             values \mapsto [
                 path \in \{\} \mapsto [
                    index \mapsto 0,
                    value \mapsto Nil
NextConfiguration \triangleq
   \vee \exists n \in Nodes:
        Log!Action(ReconcileConfiguration(n), [node \mapsto n])
\ * Modification History
```

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