

EXTENDS *Naturals*

CONSTANTS N, Up, Dn

ASSUME $N \in Nat$

VARIABLES i, dir

True when elevator is at floor f

$At(f) \triangleq i = 2 * f - 1$

$IsBetween \triangleq i \% 2 = 0$

$Init \triangleq \begin{aligned} &\wedge i = 1 \\ &\wedge dir \in \{Up, Dn\} \end{aligned}$

$UpFlr \triangleq \begin{aligned} &\wedge \exists f \in 1 \dots N - 1 : At(f) \\ &\wedge i' = i + 1 \\ &\wedge dir' = Up \end{aligned}$

$UpBetween \triangleq \begin{aligned} &\wedge IsBetween \\ &\wedge dir = Up \\ &\wedge i' = i + 1 \\ &\wedge UNCHANGED \ dir \end{aligned}$

$DnFlr \triangleq \begin{aligned} &\wedge \exists f \in 2 \dots N : At(f) \\ &\wedge i' = i - 1 \\ &\wedge dir' = Dn \end{aligned}$

$DnBetween \triangleq \begin{aligned} &\wedge IsBetween \\ &\wedge dir = Dn \\ &\wedge i' = i - 1 \\ &\wedge UNCHANGED \ dir \end{aligned}$

$Next \triangleq \begin{aligned} &\vee UpFlr \\ &\vee UpBetween \\ &\vee DnFlr \\ &\vee DnBetween \end{aligned}$

$v \triangleq \langle i, dir \rangle$

$L \triangleq \begin{aligned} &\wedge WF_v(UpBetween) \\ &\wedge WF_v(DnBetween) \\ &\wedge WF_v(UpFlr) \\ &\wedge WF_v(DnFlr) \\ &\wedge \forall f \in 2 \dots N - 1 : \\ &\quad \wedge SF_i(UpFlr \wedge At(f)) \\ &\quad \wedge SF_i(DnFlr \wedge At(f)) \end{aligned}$

$$Spec \triangleq Init \wedge \Box[Next]_v \wedge L$$
