MODULE *crackers5a*

CONSTANTS *Things*, *People*
VARIABLES *desires*, *holds*

$$
\begin{array}{l}
Init \triangleq \\
\quad \land\ desires = [p \in People \mapsto \{\}] \\
\quad \land\ holds\ \ = [p \in People \mapsto \{\}]
\end{array}
$$

$$
\begin{array}{l}
Desire(p) \triangleq \\
\quad \land\ desires[p] = \{\} \\
\quad \land\ holds[p] = \{\} \\
\quad \land\ \exists\, t \in Things : \\
\qquad \land\ desires' = [desires \text{ EXCEPT } ![p] = \{t\}] \\
\qquad \land\ \text{UNCHANGED } holds
\end{array}
$$

$$
\begin{array}{l}
Acquire(p) \triangleq \exists\, t \in desires[p] : \\
\quad \land\ \neg Held(t) \\
\quad \land\ holds' = [holds \text{ EXCEPT } ![p] = holds[p] \cup \{t\}] \\
\quad \land\ \text{UNCHANGED } desires
\end{array}
$$

$$
\begin{array}{l}
Satiated(p) \triangleq \\
\quad \land\ desires[p] \neq \{\} \\
\quad \land\ \forall\, t \in desires[p] : t \in holds[p] \\
\quad \land\ desires' = [desires \text{ EXCEPT } ![p] = \{\}] \\
\quad \land\ \text{UNCHANGED } holds
\end{array}
$$

$$
\begin{array}{l}
TidyUp(p) \triangleq \\
\quad \land\ desires[p] = \{\} \\
\quad \land\ \exists\, t \in holds[p] : \\
\qquad \land\ holds' = [holds \text{ EXCEPT } ![p] = holds[p] \setminus \{t\}] \\
\qquad \land\ \text{UNCHANGED } desires
\end{array}
$$

$$
\begin{array}{l}
Next \triangleq \exists\, p \in People : \\
\quad \lor\ Desire(p) \\
\quad \lor\ Acquire(p) \\
\quad \lor\ Satiated(p) \\
\quad \lor\ TidyUp(p)
\end{array}
$$

$$Held(t) \triangleq \exists\, p \in People : t \in holds[p]$$

$$
\begin{array}{l}
TidiesUp \triangleq \neg\exists\, p \in People : \\
\quad \land\ desires[p] \neq \{\} \\
\quad \land\ \exists\, l \in holds[p] : l \notin desires[p]
\end{array}
$$

$$Exclusivity \triangleq \neg\exists\, p,\, q \in People : p \neq q \land (holds[p] \cap holds[q]) \neq \{\}$$

$$Spec \triangleq Init \land \Box[Next]_{\langle desires,\, holds \rangle}$$