MODULE *crackers6a*

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

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

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

$$
\begin{array}{l}
Acquire(p) \triangleq \exists\, t \in desires[p] : \\
\quad \land \neg Held(t) \\
\quad \land \neg\exists\, t2 \in desires[p] : t2 \notin holds[p] \land ChooseBefore(t2,\, t) \\
\quad \land holds' = [holds \text{ EXCEPT } ![p] = holds[p] \cup \{t\}] \\
\quad \land \text{UNCHANGED } desires
\end{array}
$$

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

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

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

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

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

$$
\begin{array}{l}
Ordering \triangleq \land \forall\, x,\, y,\, z \in Things : \\
\quad ChooseBefore(x,\, y) \land ChooseBefore(y,\, z) \Rightarrow ChooseBefore(x,\, z) \\
\quad \land \forall\, x \in Things : \neg ChooseBefore(x,\, x)
\end{array}
$$

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