MODULE *SetEuclid*

EXTENDS *Integers*, *GCD*, *FiniteSets*

RECURSIVE $SetSum(\_)$

$$SetSum(T) \triangleq \text{IF } T = \{\} \text{ THEN } 0 \text{ ELSE LET } t \triangleq \text{CHOOSE } x \in T : \text{TRUE IN } t + SetSum(T \setminus \{t\})$$

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--fair algorithm *SetEuclid* **{**
variables $Input = \{2, 4, 6\}$, $S = Input$ **;**
{ while ($Cardinality(S) > 1$ **) { with (** $x \in S$, $y \in \{s \in S : s > x\}$ **)**
{ $S := (S \setminus \{y\}) \cup \{y - x\}$ **} } ;**
}
}

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BEGIN TRANSLATION

VARIABLES *Input*, *S*, *pc*

$$vars \triangleq \langle Input, S, pc \rangle$$

$$\begin{aligned} Init \triangleq\ & \text{Global variables} \\ & \land Input = \{2, 4, 6\} \\ & \land S = Input \\ & \land pc = \text{“Lbl\_1”} \end{aligned}$$

$$\begin{aligned} Lbl\_1 \triangleq\ & \land pc = \text{“Lbl\_1”} \\ & \land \text{IF } Cardinality(S) > 1 \\ & \quad \text{THEN } \land \exists\, x \in S : \\ & \qquad\qquad \exists\, y \in \{s \in S : s > x\} : \\ & \qquad\qquad\quad S' = ((S \setminus \{y\}) \cup \{y - x\}) \\ & \qquad\quad \land pc' = \text{“Lbl\_1”} \\ & \quad \text{ELSE } \land pc' = \text{“Done”} \\ & \qquad\quad \land S' = S \\ & \land Input' = Input \end{aligned}$$

$$\begin{aligned} Next \triangleq\ & Lbl\_1 \\ & \lor \text{Disjunct to prevent deadlock on termination} \\ & \quad (pc = \text{“Done”} \land \text{UNCHANGED } vars) \end{aligned}$$

$$\begin{aligned} Spec \triangleq\ & \land Init \land \Box[Next]_{vars} \\ & \land \mathrm{WF}_{vars}(Next) \end{aligned}$$

$$Termination \triangleq \Diamond(pc = \text{“Done”})$$

END TRANSLATION

\ ∗ Modification History
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