MODULE *Token*

EXTENDS *Naturals*, *TLC*, *FiniteSets*, *Helper*

CONSTANTS *CONTRACTS*, set of contracts in *Tezos*
TOKENS, set of token contracts
INIT_TOKEN initial token amount

VARIABLES *tokenMap* token amount state of contracts

$$
\begin{array}{l}
TOKENTransfer(token,\ owner,\ receiver,\ amount) \triangleq \\
\quad \text{IF } owner = receiver \\
\quad\ \text{THEN UNCHANGED } tokenMap \\
\quad\ \text{ELSE} \\
\quad tokenMap' = \\
\quad\quad [t \in TOKENS \mapsto \\
\quad\quad\ [x \in CONTRACTS \mapsto \\
\quad\quad\quad \text{IF } t = token \\
\quad\quad\quad\ \text{THEN CASE } x = owner \rightarrow tokenMap[t][x] - amount \\
\quad\quad\quad\quad\quad\quad \square\ \ x = receiver \rightarrow tokenMap[t][x] + amount \\
\quad\quad\quad\quad\quad\quad \square\ \ \text{OTHER } \rightarrow tokenMap[t][x] \\
\quad\quad\quad\ \text{ELSE } tokenMap[t][x]]]
\end{array}
$$

$$
\begin{array}{l}
tokenMapChecker \triangleq \\
\quad [t \in TOKENS \mapsto Sum(Range(tokenMap[t]))] = \\
\quad\quad [t \in TOKENS \mapsto Cardinality(CONTRACTS) * INIT\_TOKEN]
\end{array}
$$

$$
\begin{array}{l}
TokenInit \triangleq \\
\quad \land\ tokenMap = [t \in TOKENS \mapsto [x \in CONTRACTS \mapsto INIT\_TOKEN]] \\
\quad \text{pick is the variable from } Helper \\
\quad \land\ pick = [\\
\quad\quad\ token\ \mapsto RandomElement(TOKENS), \\
\quad\quad\ owner \mapsto RandomElement(CONTRACTS), \\
\quad\quad\ receiver \mapsto RandomElement(CONTRACTS), \\
\quad\quad\ amount \mapsto RandomElement(0\ ..\ INIT\_TOKEN * 2) \\
\quad\quad]
\end{array}
$$

$$
\begin{array}{l}
TokenNext \triangleq \\
\quad \land\ pick' = [\\
\quad\quad\ token\ \mapsto RandomElement(TOKENS), \\
\quad\quad\ owner \mapsto RandomElement(CONTRACTS), \\
\quad\quad\ receiver \mapsto RandomElement(CONTRACTS), \\
\quad\quad\ amount \mapsto RandomElement(0\ ..\ INIT\_TOKEN * 2) \\
\quad\quad] \\
\quad \land\ \text{IF } tokenMap[pick.token][pick.owner] \geq pick.amount
\end{array}
$$

THEN $TOKENTransfer(pick.token,$
$pick.owner,$
$pick.receiver,$
$pick.amount)$
ELSE UNCHANGED $tokenMap$