MODULE *appex*3_7

EXTENDS *Naturals*, *Integers*
CONSTANTS a, b, $z0$
VARIABLES x, y, z, pc
ASSUME $a \in Nat \land b \in Nat$
$typeInt(u) \triangleq u \in Int$
$maxi(u, v) \triangleq$ IF $u < v$ THEN v ELSE u

$al0l1 \triangleq$
$\land pc = \text{“l0”}$
$\land pc' = \text{“l1”}$
$\land x < y$
$\land z' = z \land x' = x \land y' = y$
$al1l2 \triangleq$
$\land pc = \text{“l1”}$
$\land pc' = \text{“l2”}$
$\land z' = y$
$\land x' = x \land y' = y$
$al2l5 \triangleq$
$\land pc = \text{“l2”}$
$\land pc' = \text{“l5”}$
$\land z' = z \land x' = x \land y' = y$
$al0l3 \triangleq$
$\land pc = \text{“l0”}$
$\land pc' = \text{“l3”}$
$\land x \geq y$
$\land z' = z \land x' = x \land y' = y$
$al3l4 \triangleq$
$\land pc = \text{“l3”}$
$\land pc' = \text{“l4”}$
$\land z' = x$
$\land x' = x \land y' = y$
$al4l5 \triangleq$
$\land pc = \text{“l4”}$
$\land pc' = \text{“l5”}$
$\land z' = z \land x' = x \land y' = y$

$Next \triangleq al0l1 \lor al1l2 \lor al2l5 \lor al0l3 \lor al3l4 \lor al4l5 \lor$ UNCHANGED $\langle x, y, z, pc \rangle$
$Init \triangleq pc = \text{“l0”} \land x = a \land y = b \land z = z0$

$i \triangleq$
$\land typeInt(x) \land typeInt(y) \land typeInt(z)$
$\land pc = \text{“l0”} \Rightarrow x = a \land y = b$
$\land pc = \text{“l1”} \Rightarrow x < y \land x = a \land y = b$
$\land pc = \text{“l2”} \Rightarrow x < y \land x = a \land y = b \land z = b$

$\wedge\ pc = \text{“l3”} \Rightarrow x \geq y \wedge x = a \wedge y = b$
$\wedge\ pc = \text{“l4”} \Rightarrow x \geq y \wedge x = a \wedge y = b \wedge z = a$
$\wedge\ pc = \text{“l5”} \Rightarrow ((a < b \wedge z = b) \vee (a \geq b \wedge z = a))$
$safe \triangleq pc = \text{“l5”} \Rightarrow z = maxi(a,\ b)$
$safeab \triangleq x = a \wedge y = b$

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