MODULE $malgtd1ex11$

EXTENDS $Naturals$, $Integers$

CONSTANTS $x0$, $y0$, $z0$, $mini0$, $maxi0$

VARIABLES x, y, z, pc

$typeInt(u) \triangleq u \in Int$

$maxi(u, v) \triangleq$ IF $u < v$ THEN v ELSE u

$pre \triangleq x0 \in Nat \land y0 \in Nat \land z0 \in Int$

ASSUME pre

$al0l1 \triangleq$
$\land pc = \text{“l0”}$
$\land pc' = \text{“l1”}$
$\land x < y$
$\land z' = z \land x' = x \land y' = y$

$al1l2 \triangleq$
$\land pc = \text{“l1”}$
$\land pc' = \text{“l2”}$
$\land z' = y$
$\land x' = x \land y' = y$

$al2l5 \triangleq$
$\land pc = \text{“l2”}$
$\land pc' = \text{“l5”}$
$\land z' = z \land x' = x \land y' = y$

$al0l3 \triangleq$
$\land pc = \text{“l0”}$
$\land pc' = \text{“l3”}$
$\land x \geq y$
$\land$ UNCHANGED $\langle z, x, y \rangle$

$al3l4 \triangleq$
$\land pc = \text{“l3”}$
$\land pc' = \text{“l4”}$
$\land z' = x$
$\land x' = x \land y' = y$

$al4l5 \triangleq$
$\land pc = \text{“l4”}$
$\land pc' = \text{“l5”}$
$\land z' = z \land x' = x \land y' = y$

$Next \triangleq al0l1 \lor al1l2 \lor al2l5 \lor al0l3 \lor al3l4 \lor al4l5 \lor$ UNCHANGED $\langle x, y, z, pc \rangle$

$Init \triangleq pc = \text{“l0”} \land x = x0 \land y = y0 \land z = z0$

$i \triangleq$
$\land typeInt(x) \land typeInt(y) \quad \land typeInt(z)$
$\land pc = \text{“l0”} \Rightarrow x = x0 \land y = y0 \land z = z0 \land pre$
$\land pc = \text{“l1”} \Rightarrow x < y \land x = x0 \land y = y0 \land z = z0 \land pre$

$\land\ pc = \text{“l2”} \Rightarrow x < y \land x = x0 \land y = y0 \land z = y0 \land pre$
$\land\ pc = \text{“l3”} \Rightarrow x \geq y \land x = x0 \land y = y0 \land z = z0 \land pre$
$\land\ pc = \text{“l4”} \Rightarrow x \geq y \land x = x0 \land y = y0 \land z = x0 \ \land pre$
$\land\ pc = \text{“l5”} \Rightarrow z = maxi(x0,\ y0) \land x = x0 \land y = y0 \ \land pre$

$safepc \triangleq \ pc = \text{“l5”} \Rightarrow \ z = maxi(x0,\ y0)$

$safeab \triangleq \ x = x0 \land y = y0$

$saferte \triangleq$
$\land\ mini0 \leq x \land x \leq maxi0$
$\land\ mini0 \leq y \land y \leq maxi0$

\ * Modification History
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