

## t40\_scm\_halt

(TMJKQBK5vWTEbZY6uCRvTsWh5HvoYv3XEXM)

October 27, 2020

Let  $v1\_relat\_1 : \iota \Rightarrow o$  be given. Let  $v4\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k5\_numbers : \iota$  be given. Let  $v5\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_compos\_1 : \iota \Rightarrow \iota$  be given. Let  $k1\_scmfsa\_2 : \iota$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_partfun1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $v5\_funct\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k2\_memstr\_0 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $np\_3 : \iota$  be given. Let  $v1\_xboole\_0 : \iota \Rightarrow o$  be given. Let  $v1\_finset\_1 : \iota \Rightarrow o$  be given. Let  $v1\_afinsq\_1 : \iota \Rightarrow o$  be given. Let  $v1\_ami\_2 : \iota \Rightarrow o$  be given. Let  $v1\_scmfsa\_m : \iota \Rightarrow o$  be given. Let  $m1\_subset\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r1\_scm\_halt : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r2\_scm\_halt : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r1\_xxreal\_0 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_funct\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k6\_numbers : \iota$  be given. Let  $r8\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_scmfsa6b : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_scmfsa8b : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k1\_funct\_4 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k7\_memstr\_0 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k2\_nat\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $k5\_card\_1 : \iota \Rightarrow \iota$  be given. Let  $r6\_scmfsa7b : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k1\_scmfsa\_m : \iota \Rightarrow \iota$  be given. Let  $r5\_scmfsa7b : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned}
 & \forall X0.((v1\_relat\_1 X0) \wedge ((v4\_relat\_1 X0 k5\_numbers) \wedge ((v5\_relat\_1 \\
 & X0 (u1\_compos\_1 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X0) \wedge (v1\_partfun1 \\
 & X0 k5\_numbers)))) \Rightarrow (\forall X1.((v1\_relat\_1 X1) \wedge ((v4\_relat\_1 \\
 & X1 (u1\_struct\_0 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X1) \wedge ((v5\_funct\_1 \\
 & X1 (k2\_memstr\_0 np\_3 k1\_scmfsa\_2)) \wedge (v1\_partfun1 X1 (u1\_struct\_0 \\
 & k1\_scmfsa\_2)))))) \Rightarrow (\forall X2.((\neg v1\_xboole\_0 X2) \wedge ((v1\_relat\_1 \\
 & X2) \wedge ((v4\_relat\_1 X2 k5\_numbers) \wedge ((v5\_relat\_1 X2 (u1\_compos\_1 \\
 & k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X2) \wedge ((v1\_finset\_1 X2) \wedge (v1\_afinsq\_1 \\
 & X2)))))) \Rightarrow ((r2\_scm\_halt X2 X1 X0) \Leftrightarrow (r6\_scmfsa7b X2 (k1\_scmfsa\_m \\
 & X1) X0)))
 \end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((v1\_relat\_1 X0) \wedge ((v4\_relat\_1 X0 k5\_numbers) \wedge ((v5\_relat\_1 \\
& X0 (u1\_compos\_1 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X0) \wedge (v1\_partfun1 \\
& X0 k5\_numbers)))))) \Rightarrow (\forall X1.((v1\_relat\_1 X1) \wedge ((v4\_relat\_1 \\
& X1 (u1\_struct\_0 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X1) \wedge ((v5\_funct\_1 \\
& X1 (k2\_memstr\_0 np\_3 k1\_scmfsa\_2)) \wedge (v1\_partfun1 X1 (u1\_struct\_0 \\
& k1\_scmfsa\_2)))))) \Rightarrow (\forall X2.((\neg v1\_xboole\_0 X2) \wedge ((v1\_relat\_1 \\
& X2) \wedge ((v4\_relat\_1 X2 k5\_numbers) \wedge ((v5\_relat\_1 X2 (u1\_compos\_1 \\
& k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X2) \wedge ((v1\_finset\_1 X2) \wedge (v1\_afinsq\_1 \\
& X2)))))) \Rightarrow ((r1\_scm\_halt X2 X1 X0) \Leftrightarrow (r5\_scmfsa7b X2 (k1\_scmfsa\_m \\
& X1) X0)))
\end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((v1\_relat\_1 X0) \wedge ((v4\_relat\_1 X0 k5\_numbers) \wedge ((v5\_relat\_1 \\
& X0 (u1\_compos\_1 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X0) \wedge (v1\_partfun1 \\
& X0 k5\_numbers)))))) \Rightarrow (\forall X1.((\neg v1\_xboole\_0 X1) \wedge ((v1\_relat\_1 \\
& X1) \wedge ((v4\_relat\_1 X1 k5\_numbers) \wedge ((v5\_relat\_1 X1 (u1\_compos\_1 \\
& k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X1) \wedge ((v1\_finset\_1 X1) \wedge (v1\_afinsq\_1 \\
& X1)))))) \Rightarrow (\forall X2.((\neg v1\_xboole\_0 X2) \wedge ((v1\_relat\_1 X2) \wedge \\
& ((v4\_relat\_1 X2 k5\_numbers) \wedge ((v5\_relat\_1 X2 (u1\_compos\_1 k1\_scmfsa\_2)) \wedge \\
& ((v1\_funct\_1 X2) \wedge ((v1\_finset\_1 X2) \wedge (v1\_afinsq\_1 X2)))))) \Rightarrow \\
& (\forall X3.((v1\_ami\_2 X3) \wedge ((\neg v1\_scmfsa\_m X3) \wedge (m1\_subset\_1 \\
& X3 (u1\_struct\_0 k1\_scmfsa\_2)))) \Rightarrow (\forall X4.((v1\_relat\_1 X4) \wedge \\
& ((v4\_relat\_1 X4 (u1\_struct\_0 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X4) \wedge \\
& ((v5\_funct\_1 X4 (k2\_memstr\_0 np\_3 k1\_scmfsa\_2)) \wedge (v1\_partfun1 \\
& X4 (u1\_struct\_0 k1\_scmfsa\_2)))))) \Rightarrow (((r5\_scmfsa7b X1 (k1\_scmfsa\_m \\
& X4) X0) \wedge (r6\_scmfsa7b X1 (k1\_scmfsa\_m X4) X0)) \Rightarrow ((r1\_xreal\_0 ( \\
& k1\_funct\_1 X4 X3) k6\_numbers) \vee (r8\_pboole (u1\_struct\_0 k1\_scmfsa\_2) \\
& (k1\_scmfsa6b (k2\_scmfsa8b X3 X1 X2) X4 X0) (k1\_funct\_4 (k1\_scmfsa6b \\
& X1 X4 X0) (k7\_memstr\_0 np\_3 k1\_scmfsa\_2 (k2\_nat\_1 (k2\_nat\_1 (k5\_card\_1 \\
& X1) (k5\_card\_1 X2)) np\_3))))))))))
\end{aligned} \tag{3}$$

**Theorem 1**

$$\begin{aligned}
& \forall X0.((v1\_relat\_1 X0) \wedge ((v4\_relat\_1 X0 k5\_numbers) \wedge ((v5\_relat\_1 \\
& X0 (u1\_compos\_1 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X0) \wedge (v1\_partfun1 \\
& X0 k5\_numbers)))))) \Rightarrow (\forall X1.((v1\_relat\_1 X1) \wedge ((v4\_relat\_1 \\
& X1 (u1\_struct\_0 k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X1) \wedge ((v5\_funct\_1 \\
& X1 (k2\_memstr\_0 np\_3 k1\_scmfsa\_2)) \wedge (v1\_partfun1 X1 (u1\_struct\_0 \\
& k1\_scmfsa\_2)))))) \Rightarrow (\forall X2.((\neg v1\_xboole\_0 X2) \wedge ((v1\_relat\_1 \\
& X2) \wedge ((v4\_relat\_1 X2 k5\_numbers) \wedge ((v5\_relat\_1 X2 (u1\_compos\_1 \\
& k1\_scmfsa\_2)) \wedge ((v1\_funct\_1 X2) \wedge ((v1\_finset\_1 X2) \wedge (v1\_afinsq\_1 \\
& X2)))))) \Rightarrow (\forall X3.((\neg v1\_xboole\_0 X3) \wedge ((v1\_relat\_1 X3) \wedge \\
& ((v4\_relat\_1 X3 k5\_numbers) \wedge ((v5\_relat\_1 X3 (u1\_compos\_1 k1\_scmfsa\_2)) \wedge \\
& ((v1\_funct\_1 X3) \wedge ((v1\_finset\_1 X3) \wedge (v1\_afinsq\_1 X3)))))) \Rightarrow \\
& (\forall X4.((v1\_ami\_2 X4) \wedge ((\neg v1\_scmfsa\_m X4) \wedge (m1\_subset\_1 \\
& X4 (u1\_struct\_0 k1\_scmfsa\_2)))))) \Rightarrow (((r1\_scm\_halt X2 X1 X0) \wedge (r2\_scm\_halt \\
& X2 X1 X0)) \Rightarrow ((r1\_xreal\_0 (k1\_funct\_1 X1 X4) k6\_numbers) \vee (r8\_pboole \\
& (u1\_struct\_0 k1\_scmfsa\_2) (k1\_scmfsa6b (k2\_scmfsa8b X4 X2 X3) \\
& X1 X0) (k1\_funct\_4 (k1\_scmfsa6b X2 X1 X0) (k7\_memstr\_0 np\_3 k1\_scmfsa\_2 \\
& (k2\_nat\_1 (k2\_nat\_1 (k5\_card\_1 X2) (k5\_card\_1 X3)) np\_3))))))))))
\end{aligned}$$