

# t15\_msualg\_3 (TMTpzA- WsNE3FwFKzkkUGarKgoW4yLSUubv2)

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Let  $v2\_struct\_0 : \iota \Rightarrow o$  be given. Let  $v11\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l1\_msualg\_1 : \iota \Rightarrow o$  be given. Let  $v4\_msualg\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $l3\_msualg\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $m2\_pboole : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $u1\_struct\_0 : \iota \Rightarrow \iota$  be given. Let  $u3\_msualg\_1 : \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r4\_msualg\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $k3\_msualg\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota$  be given. Let  $r3\_msualg\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $r2\_msualg\_3 : \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $l1\_struct\_0 : \iota \Rightarrow o$  be given. Let  $l2\_msualg\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v1\_relat\_1 : \iota \Rightarrow o$  be given. Let  $v2\_relat\_1 : \iota \Rightarrow o$  be given. Let  $v4\_relat\_1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $v1\_funct\_1 : \iota \Rightarrow o$  be given. Let  $v1\_partfun1 : \iota \Rightarrow \iota \Rightarrow o$  be given. Let  $l5\_struct\_0 : \iota \Rightarrow o$  be given. Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge (l1\_msualg\_1 \\
& X0))) \Rightarrow (\forall X1.((v4\_msualg\_1 X1 X0) \wedge (l3\_msualg\_1 X1 X0)) \Rightarrow \\
& (\forall X2.((v4\_msualg\_1 X2 X0) \wedge (l3\_msualg\_1 X2 X0)) \Rightarrow (\forall X3. \\
& ((v4\_msualg\_1 X3 X0) \wedge (l3\_msualg\_1 X3 X0)) \Rightarrow (\forall X4.(m2\_pboole \\
& X4 (u1\_struct\_0 X0) (u3\_msualg\_1 X0 X1) (u3\_msualg\_1 X0 X2)) \Rightarrow (\forall X5. \\
& (m2\_pboole X5 (u1\_struct\_0 X0) (u3\_msualg\_1 X0 X2) (u3\_msualg\_1 \\
& X0 X3)) \Rightarrow (((r3\_msualg\_3 X0 X1 X2 X4) \wedge (r3\_msualg\_3 X0 X2 X3 X5)) \Rightarrow ( \\
& r3\_msualg\_3 X0 X1 X3 (k3\_msualg\_3 (u1\_struct\_0 X0) (u3\_msualg\_1 \\
& X0 X1) (u3\_msualg\_1 X0 X2) (u3\_msualg\_1 X0 X3) X4 X5)))))))))
\end{aligned} \tag{1}$$

Assume the following.

$$\begin{aligned}
& \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge (l1\_msualg\_1 \\
& X0))) \Rightarrow (\forall X1.((v4\_msualg\_1 X1 X0) \wedge (l3\_msualg\_1 X1 X0)) \Rightarrow \\
& (\forall X2.((v4\_msualg\_1 X2 X0) \wedge (l3\_msualg\_1 X2 X0)) \Rightarrow (\forall X3. \\
& ((v4\_msualg\_1 X3 X0) \wedge (l3\_msualg\_1 X3 X0)) \Rightarrow (\forall X4.(m2\_pboole \\
& X4 (u1\_struct\_0 X0) (u3\_msualg\_1 X0 X1) (u3\_msualg\_1 X0 X2)) \Rightarrow (\forall X5. \\
& (m2\_pboole X5 (u1\_struct\_0 X0) (u3\_msualg\_1 X0 X2) (u3\_msualg\_1 \\
& X0 X3)) \Rightarrow (((r2\_msualg\_3 X0 X1 X2 X4) \wedge (r2\_msualg\_3 X0 X2 X3 X5)) \Rightarrow ( \\
& r2\_msualg\_3 X0 X1 X3 (k3\_msualg\_3 (u1\_struct\_0 X0) (u3\_msualg\_1 \\
& X0 X1) (u3\_msualg\_1 X0 X2) (u3\_msualg\_1 X0 X3) X4 X5)))))))))
\end{aligned} \tag{2}$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((l1\_struct\_0 X0) \wedge ((v4\_msualg\_1 X1 X0) \wedge \\ & (l2\_msualg\_1 X1 X0))) \Rightarrow ((v1\_relat\_1 (u3\_msualg\_1 X0 X1)) \wedge ((v2\_relat\_1 \\ & (u3\_msualg\_1 X0 X1)) \wedge ((v4\_relat\_1 (u3\_msualg\_1 X0 X1) (u1\_struct\_0 \\ & X0)) \wedge ((v1\_funct\_1 (u3\_msualg\_1 X0 X1)) \wedge (v1\_partfun1 (u3\_msualg\_1 \\ & X0 X1) (u1\_struct\_0 X0)))))) \end{aligned} \quad (3)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. ((l1\_struct\_0 X0) \wedge (l2\_msualg\_1 X1 X0)) \Rightarrow \\ & ((v1\_relat\_1 (u3\_msualg\_1 X0 X1)) \wedge ((v4\_relat\_1 (u3\_msualg\_1 \\ & X0 X1) (u1\_struct\_0 X0)) \wedge ((v1\_funct\_1 (u3\_msualg\_1 X0 X1)) \wedge (v1\_partfun1 \\ & (u3\_msualg\_1 X0 X1) (u1\_struct\_0 X0)))))) \end{aligned} \quad (4)$$

Assume the following.

$$\forall X0. (l5\_struct\_0 X0) \Rightarrow (l1\_struct\_0 X0) \quad (5)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge (l1\_msualg\_1 X0)) \Rightarrow (\forall X1. \\ & (l3\_msualg\_1 X1 X0) \Rightarrow (l2\_msualg\_1 X1 X0)) \end{aligned} \quad (6)$$

Assume the following.

$$\forall X0. (l1\_msualg\_1 X0) \Rightarrow (l5\_struct\_0 X0) \quad (7)$$

Assume the following.

$$\begin{aligned} & \forall X0. \forall X1. \forall X2. \forall X3. \forall X4. \forall X5. \\ & (((v1\_relat\_1 X1) \wedge ((v4\_relat\_1 X1 X0) \wedge ((v1\_funct\_1 X1) \wedge (v1\_partfun1 \\ & X1 X0)))) \wedge (((v1\_relat\_1 X2) \wedge ((v2\_relat\_1 X2) \wedge ((v4\_relat\_1 X2 \\ & X0) \wedge ((v1\_funct\_1 X2) \wedge (v1\_partfun1 X2 X0)))))) \wedge (((v1\_relat\_1 \\ & X3) \wedge ((v2\_relat\_1 X3) \wedge ((v4\_relat\_1 X3 X0) \wedge ((v1\_funct\_1 X3) \wedge ( \\ & v1\_partfun1 X3 X0)))))) \wedge ((m2\_pboole X4 X0 X1 X2) \wedge (m2\_pboole X5 X0 \\ & X2 X3)))) \Rightarrow (m2\_pboole (k3\_msualg\_3 X0 X1 X2 X3 X4 X5) X0 X1 X3) \end{aligned} \quad (8)$$

Assume the following.

$$\begin{aligned} & \forall X0. ((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge (l1\_msualg\_1 \\ & X0))) \Rightarrow (\forall X1. (l3\_msualg\_1 X1 X0) \Rightarrow (\forall X2. (l3\_msualg\_1 \\ & X2 X0) \Rightarrow (\forall X3. (m2\_pboole X3 (u1\_struct\_0 X0) (u3\_msualg\_1 \\ & X0 X1) (u3\_msualg\_1 X0 X2)) \Rightarrow ((r4\_msualg\_3 X0 X1 X2 X3) \Leftrightarrow ((r2\_msualg\_3 \\ & X0 X1 X2 X3) \wedge (r3\_msualg\_3 X0 X1 X2 X3)))))) \end{aligned} \quad (9)$$

**Theorem 1**

$$\begin{aligned} & \forall X0.((\neg v2\_struct\_0 X0) \wedge ((\neg v11\_struct\_0 X0) \wedge (l1\_msualg\_1 \\ & X0))) \Rightarrow (\forall X1.((v4\_msualg\_1 X1 X0) \wedge (l3\_msualg\_1 X1 X0)) \Rightarrow \\ & (\forall X2.((v4\_msualg\_1 X2 X0) \wedge (l3\_msualg\_1 X2 X0)) \Rightarrow (\forall X3. \\ & ((v4\_msualg\_1 X3 X0) \wedge (l3\_msualg\_1 X3 X0)) \Rightarrow (\forall X4.(m2\_pboole \\ & X4 (u1\_struct\_0 X0) (u3\_msualg\_1 X0 X1) (u3\_msualg\_1 X0 X2)) \Rightarrow (\forall X5. \\ & (m2\_pboole X5 (u1\_struct\_0 X0) (u3\_msualg\_1 X0 X2) (u3\_msualg\_1 \\ & X0 X3)) \Rightarrow (((r4\_msualg\_3 X0 X1 X2 X4) \wedge (r4\_msualg\_3 X0 X2 X3 X5)) \Rightarrow ( \\ & r4\_msualg\_3 X0 X1 X3 (k3\_msualg\_3 (u1\_struct\_0 X0) (u3\_msualg\_1 \\ & X0 X1) (u3\_msualg\_1 X0 X2) (u3\_msualg\_1 X0 X3) X4 X5))))))))) \end{aligned}$$