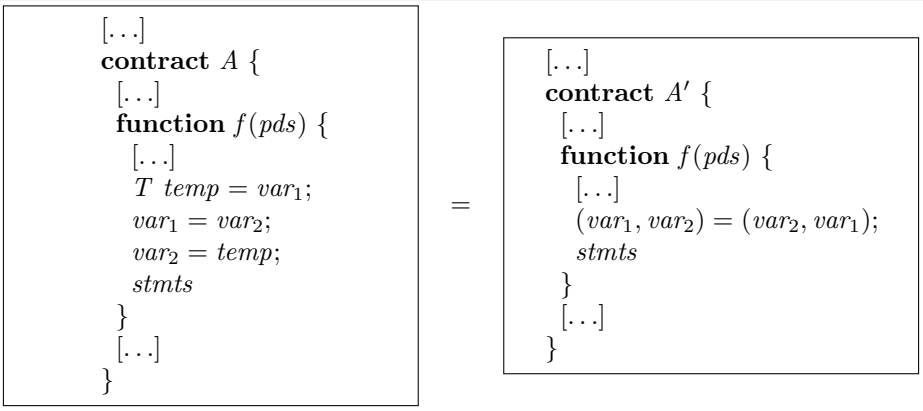
**Rule 0.18** ⟨*Use Single-Line Variable Swapping*⟩




**where**

$var_1$ and $var_2$ are variables of type $T$ being swapped;

*temp* is a temporary variable of type $T$ used for the traditional swap;

$T$ is the type of the variables being swapped;

*pds* are the parameter declarations of function $f$;

*stmts* represents the sequence of statements following the swap.

**provided**

The variables $var_1$ and $var_2$ are of the same type $T$;

The traditional three-step swap pattern is used in contract $A$;

The temporary variable *temp* is used only for the swap operation;

No side effects occur during the evaluation of $var_1$ and $var_2$;

The tuple assignment maintains the same semantics as the traditional swap.

**Invariant:**

Let $s_i$ and $s_i'$ be the initial state of $A$ and $A'$, respectively.

Let $s_f$ and $s_f'$ be the state reached by $A$ and $A'$, respectively, after $A.f()$ and $A'.f()$ are executed from $s_i$ and $s_i'$, respectively.

Then, the coupling invariant is

$$\forall\, s_i, s_i' \;.\; (s_i = s_i') \rightarrow (s_f = s_f')$$