
MODULE *apex4_1_2*

EXTENDS *Integers, Naturals, TLC*

CONSTANTS *p*

– wfnNext

```

--algorithm test {
variables  $x = 2^p, y = (2^p) * 2;$ 
{
l1: assert  $x = 2^p \wedge y = (2^p) * 2 \wedge x * y = 2^{(2*p+1)};$ 
 $x := y + x + (2^x);$ 
l2: assert  $x = 5 * (2^p) \wedge y = 2^{(p+1)};$ 

l3: print  $\langle x, y \rangle;$ 
}
}

```

BEGIN TRANSLATION

VARIABLES *x, y, pc*

vars $\triangleq \langle x, y, pc \rangle$

Init \triangleq Global variables
 $\wedge x = 2^p$
 $\wedge y = (2^p) * 2$
 $\wedge pc = \text{"l1"}$

l1 \triangleq $\wedge pc = \text{"l1"}$
 $\wedge \text{Assert}(x = 2^p \wedge y = (2^p) * 2 \wedge x * y = 2^{(2*p+1)},$
"Failure of assertion at line 11, column 4.")
 $\wedge x' = y + x + (2^x)$
 $\wedge pc' = \text{"l2"}$
 $\wedge y' = y$

l2 \triangleq $\wedge pc = \text{"l2"}$
 $\wedge \text{Assert}(x = 5 * (2^p) \wedge y = 2^{(p+1)},$
"Failure of assertion at line 13, column 4.")
 $\wedge pc' = \text{"l3"}$
 $\wedge \text{UNCHANGED } \langle x, y \rangle$

l3 \triangleq $\wedge pc = \text{"l3"}$
 $\wedge \text{PrintT}(\langle x, y \rangle)$
 $\wedge pc' = \text{"Done"}$
 $\wedge \text{UNCHANGED } \langle x, y \rangle$

Allow infinite stuttering to prevent deadlock on termination.

Terminating $\triangleq pc = \text{"Done"} \wedge \text{UNCHANGED } vars$

Next $\triangleq l1 \vee l2 \vee l3$

$$\vee \textit{Terminating}$$

$$\textit{Spec} \triangleq \textit{Init} \wedge \Box[\textit{Next}]_{\textit{vars}}$$

$$\textit{Termination} \triangleq \Diamond(pc = \text{"Done"})$$

END TRANSLATION

$$\textit{MAX} \triangleq 32768 \quad \text{16 bits}$$

$$\textit{D} \triangleq 0 \dots 32768$$

$$x \leq 32760$$

$$\textit{DD}(X) \triangleq (X \in \textit{D})$$

$$\textit{Safety_absence} \triangleq \textit{DD}(x) \wedge \textit{DD}(y)$$

$$\textit{Inv} \triangleq$$

$$\wedge pc = \text{"l1"} \Rightarrow x = 2^p \wedge y = 2^p * 2 \wedge x * y = 2^{(2*p+1)}$$

$$\wedge pc = \text{"l2"} \Rightarrow x = 5 * 2^p \wedge y = 2^{(p+1)}$$