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MODULE *Handshake*

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EXTENDS *Integers, Sequences*

$Put(s) \triangleq Append(s, \text{"widget"})$   
 $Get(s) \triangleq Tail(s)$

$a \oplus b \triangleq (a + b) \% 2$

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```
--algorithm Handshake{
variables p = 0, c = 0, box = ⟨⟩;
fair process ( Producer = 0 )
{ p1: while ( TRUE )
  { await p = c;
    p2: box := Put(box);
    p := p ⊕ 1
  }
}
fair process ( Consumer = 1 )
{ c1: while ( TRUE )
  { await p ≠ c;
    c2: box := Get(box);
    c := c ⊕ 1
  }
}
}
```

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BEGIN TRANSLATION

VARIABLES  $p, c, box, pc$

$vars \triangleq \langle p, c, box, pc \rangle$

$ProcSet \triangleq \{0\} \cup \{1\}$

$Init \triangleq$  Global variables  
 $\wedge p = 0$   
 $\wedge c = 0$   
 $\wedge box = \langle \rangle$   
 $\wedge pc = [self \in ProcSet \mapsto \text{CASE } self = 0 \rightarrow \text{"p1"} \\ \square \quad self = 1 \rightarrow \text{"c1"}]$

$p1 \triangleq \wedge pc[0] = \text{"p1"} \\ \wedge p = c \\ \wedge pc' = [pc \text{ EXCEPT } ![0] = \text{"p2"}] \\ \wedge \text{UNCHANGED } \langle p, c, box \rangle$

$p2 \triangleq \wedge pc[0] = \text{"p2"}$

$$\begin{aligned}
& \wedge box' = Put(box) \\
& \wedge p' = p \oplus 1 \\
& \wedge pc' = [pc \text{ EXCEPT } ![0] = \text{"p1"}] \\
& \wedge c' = c
\end{aligned}$$

$$Producer \triangleq p1 \vee p2$$

$$\begin{aligned}
c1 \triangleq & \wedge pc[1] = \text{"c1"} \\
& \wedge p \neq c \\
& \wedge pc' = [pc \text{ EXCEPT } ![1] = \text{"c2"}] \\
& \wedge \text{UNCHANGED } \langle p, c, box \rangle
\end{aligned}$$

$$\begin{aligned}
c2 \triangleq & \wedge pc[1] = \text{"c2"} \\
& \wedge box' = Get(box) \\
& \wedge c' = c \oplus 1 \\
& \wedge pc' = [pc \text{ EXCEPT } ![1] = \text{"c1"}] \\
& \wedge p' = p
\end{aligned}$$

$$Consumer \triangleq c1 \vee c2$$

$$Next \triangleq Producer \vee Consumer$$

$$\begin{aligned}
Spec \triangleq & \wedge Init \wedge \Box [Next]_{vars} \\
& \wedge WF_{vars}(Producer) \\
& \wedge WF_{vars}(Consumer)
\end{aligned}$$

END TRANSLATION

$$A \triangleq \text{INSTANCE } Alternation \text{ WITH } b \leftarrow p \oplus c, box \leftarrow box$$


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\ \* Modification History  
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