

EXTENDS *Integers*

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

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```
--algorithm Handshake{
  variables p = 0, c = 0;
  process ( Producer = 0 )
  { pe: while ( TRUE )
    {   await p = c;
        put: skip;
        px: p := p ⊕ 1   }
    }

  process ( Consumer = 1 )
  { ce: while ( TRUE )
    {   await p ≠ c;
        get: skip;
        cx: c := c ⊕ 1   }
    }
}
```

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BEGIN TRANSLATION

VARIABLES *p*, *c*, *pc*

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

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

$$Init \triangleq \begin{array}{l} \text{Global variables} \\ \wedge p = 0 \\ \wedge c = 0 \\ \wedge pc = [self \in ProcSet \mapsto \text{CASE } self = 0 \rightarrow \text{"pe"} \\ \quad \square \quad self = 1 \rightarrow \text{"ce"}] \end{array}$$

$$pe \triangleq \begin{array}{l} \wedge pc[0] = \text{"pe"} \\ \wedge p = c \\ \wedge pc' = [pc \text{ EXCEPT } ![0] = \text{"put"}] \\ \wedge \text{UNCHANGED } \langle p, c \rangle \end{array}$$

$$put \triangleq \begin{array}{l} \wedge pc[0] = \text{"put"} \\ \wedge \text{TRUE} \\ \wedge pc' = [pc \text{ EXCEPT } ![0] = \text{"px"}] \\ \wedge \text{UNCHANGED } \langle p, c \rangle \end{array}$$

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

$$\begin{aligned}
& \wedge p' = p \oplus 1 \\
& \wedge pc' = [pc \text{ EXCEPT } ![0] = \text{"pe"}] \\
& \wedge c' = c
\end{aligned}$$

$$Producer \triangleq pe \vee put \vee px$$

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

$$\begin{aligned}
get \triangleq & \wedge pc[1] = \text{"get"} \\
& \wedge \text{TRUE} \\
& \wedge pc' = [pc \text{ EXCEPT } ![1] = \text{"cx"}] \\
& \wedge \text{UNCHANGED } \langle p, c \rangle
\end{aligned}$$

$$\begin{aligned}
cx \triangleq & \wedge pc[1] = \text{"cx"} \\
& \wedge c' = c \oplus 1 \\
& \wedge pc' = [pc \text{ EXCEPT } ![1] = \text{"ce"}] \\
& \wedge p' = p
\end{aligned}$$

$$Consumer \triangleq ce \vee get \vee cx$$

$$Next \triangleq Producer \vee Consumer$$

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

END TRANSLATION

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\ \* Modification History  
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