MODULE *peterson*

$Not(i) \triangleq$ IF $i = 0$ THEN 1 ELSE 0

**********************************************************************

```
--fair algorithm PetAlg{
 variables flag = [i ∈ {0, 1} ↦ FALSE], turn = 0 ;
 process ( ProcName ∈ {0, 1} ) {
  waiting:    while ( TRUE ) {
      wantToEnter:     flag[self] := TRUE ;
      checkForOtherProcess: turn := Not(self) ;
      otherWantsToEnter: if ( flag[Not(self)] ) { goto otherProcessTurn } else { goto criticalSection } ;
      otherProcessTurn: if ( turn = Not(self) ) { goto otherWantsToEnter } else { goto criticalSection }
      criticalSection: skip ;   kao da smo pristupili kriticnoj sekciji
      exitingSection:       flag[self] := FALSE ;
     }
   } ;
 }
```

**********************************************************************

BEGIN TRANSLATION - the hash of the *PCal* code: PCal-4e1356dd7135c5f80b1643e653d94e24

VARIABLES *flag*, *turn*, *pc*

$vars \triangleq \langle flag, turn, pc \rangle$

$ProcSet \triangleq (\{0, 1\})$

$Init \triangleq$ Global variables
$\land flag = [i \in \{0, 1\} \mapsto \text{FALSE}]$
$\land turn = 0$
$\land pc = [self \in ProcSet \mapsto \text{“waiting”}]$

$waiting(self) \triangleq \land pc[self] = \text{“waiting”}$
$\land pc' = [pc \text{ EXCEPT } ![self] = \text{“wantToEnter”}]$
$\land \text{UNCHANGED } \langle flag, turn \rangle$

$wantToEnter(self) \triangleq \land pc[self] = \text{“wantToEnter”}$
$\land flag' = [flag \text{ EXCEPT } ![self] = \text{TRUE}]$
$\land pc' = [pc \text{ EXCEPT } ![self] = \text{“checkForOtherProcess”}]$
$\land turn' = turn$

$checkForOtherProcess(self) \triangleq \land pc[self] = \text{“checkForOtherProcess”}$
$\land turn' = Not(self)$
$\land pc' = [pc \text{ EXCEPT } ![self] = \text{“otherWantsToEnter”}]$
$\land flag' = flag$

$otherWantsToEnter(self) \triangleq \land pc[self] = \text{“otherWantsToEnter”}$
$\land \text{IF } flag[Not(self)]$
$\text{THEN } \land pc' = [pc \text{ EXCEPT } ![self] = \text{“otherProcessTurn”}]$

$$\begin{array}{l}
\qquad\qquad\qquad\qquad\qquad\qquad \text{ELSE} \quad \land\, pc' = [pc \text{ EXCEPT } ![self] = \text{“criticalSection”}] \\
\qquad\qquad\qquad\qquad\quad \land \text{UNCHANGED } \langle flag,\, turn \rangle
\end{array}$$

$$\begin{array}{l}
otherProcessTurn(self) \triangleq \land\, pc[self] = \text{“otherProcessTurn”} \\
\qquad\qquad\qquad\qquad\qquad\quad \land \text{IF } turn = Not(self) \\
\qquad\qquad\qquad\qquad\qquad\qquad\quad \text{THEN} \quad \land\, pc' = [pc \text{ EXCEPT } ![self] = \text{“otherWantsToEnter”}] \\
\qquad\qquad\qquad\qquad\qquad\qquad\quad \text{ELSE} \quad \land\, pc' = [pc \text{ EXCEPT } ![self] = \text{“criticalSection”}] \\
\qquad\qquad\qquad\qquad\qquad\quad \land \text{UNCHANGED } \langle flag,\, turn \rangle
\end{array}$$

$$\begin{array}{l}
criticalSection(self) \triangleq \land\, pc[self] = \text{“criticalSection”} \\
\qquad\qquad\qquad\qquad\qquad\quad \land \text{TRUE} \\
\qquad\qquad\qquad\qquad\qquad\quad \land\, pc' = [pc \text{ EXCEPT } ![self] = \text{“exitingSection”}] \\
\qquad\qquad\qquad\qquad\qquad\quad \land \text{UNCHANGED } \langle flag,\, turn \rangle
\end{array}$$

$$\begin{array}{l}
exitingSection(self) \triangleq \land\, pc[self] = \text{“exitingSection”} \\
\qquad\qquad\qquad\qquad\qquad\quad \land\, flag' = [flag \text{ EXCEPT } ![self] = \text{FALSE}] \\
\qquad\qquad\qquad\qquad\qquad\quad \land\, pc' = [pc \text{ EXCEPT } ![self] = \text{“waiting”}] \\
\qquad\qquad\qquad\qquad\qquad\quad \land\, turn' = turn
\end{array}$$

$$\begin{array}{l}
ProcName(self) \triangleq waiting(self) \lor wantToEnter(self) \\
\qquad\qquad\qquad\qquad\quad \lor checkForOtherProcess(self) \\
\qquad\qquad\qquad\qquad\quad \lor otherWantsToEnter(self) \lor otherProcessTurn(self) \\
\qquad\qquad\qquad\qquad\quad \lor criticalSection(self) \lor exitingSection(self)
\end{array}$$

$$Next \triangleq (\exists\, self \in \{0,\, 1\} : ProcName(self))$$

$$\begin{array}{l}
Spec \triangleq \land\, Init \land \Box[Next]_{vars} \\
\qquad\quad \land \mathrm{WF}_{vars}(Next)
\end{array}$$

END TRANSLATION - the hash of the generated TLA code (remove to silence divergence warnings): TLA-ec20ebca70ca18a02

$$\begin{array}{l}
TypeOK \triangleq \land\, flag \in [\{0,\, 1\} \to \text{BOOLEAN }] \\
\qquad\quad \land\, turn \in \{0,\, 1\} \\
\qquad\quad \land\, pc \in [\{0,\, 1\} \to \{\text{“waiting”},\ \text{“wantToEnter”},\ \text{“checkForOtherProcess”},\ \text{“otherWantsToEnter”},\ \text{“oth}
\end{array}$$

$$MedjusobnaIskljucivostInv \triangleq (pc[0] \# \text{“criticalSection”} \lor pc[1] \# \text{“criticalSection”})$$

$$MedjusobnaIskljucivostInv \triangleq \neg(pc[0] = \text{“criticalSection”} \land pc[1] = \text{“criticalSection”})$$

$$MedjusobnaIskljucivostInv \triangleq \exists\, i \in \{0,\, 1\} : pc[i] \# \text{“criticalSection”}$$

$$StarvationFreedomInv \triangleq \forall\, i \in \{0,\, 1\} : \Box\Diamond(pc[i] = \text{“criticalSection”})$$

$$StarvationFreedomInv \triangleq (pc[0] = \text{“otherWantsToEnter”} \rightsquigarrow pc[1] = \text{“criticalSection”})$$

* Modification History
* Last modified *Mon Mar* 09 12:31:21 *CET* 2020 by *m.mursel*
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