

Time-stamp: < 09 oct 2024 11:54 *Philippe Queinnec* >

Le problème de l'homme, du *loup*, du *mouton* et du *chou*

Version opératoire.

VARIABLES

homme,

loup,

mouton,

chou

la barque est inutile, car elle est avec l'homme.

$Rives \triangleq \{ \text{"G"}, \text{"D"} \}$

$TypeOK \triangleq$

$\Box (\wedge homme \in Rives$
 $\wedge loup \in Rives$
 $\wedge mouton \in Rives$
 $\wedge chou \in Rives)$

$pasMiam \triangleq$

$\wedge (loup = mouton \Rightarrow homme = loup)$
 $\wedge (chou = mouton \Rightarrow homme = chou)$

$ToujoursOk \triangleq \Box pasMiam$

$Solution \triangleq$

$\Box \neg (homme = \text{"D"} \wedge loup = \text{"D"} \wedge mouton = \text{"D"} \wedge chou = \text{"D"})$

$inv(r) \triangleq \text{IF } r = \text{"G"} \text{ THEN } \text{"D"} \text{ ELSE } \text{"G"}$

$Init \triangleq$

$\wedge homme = \text{"G"}$
 $\wedge loup = \text{"G"}$
 $\wedge mouton = \text{"G"}$
 $\wedge chou = \text{"G"}$

$bougeHomme \triangleq$

$\wedge homme' = inv(homme)$
 $\wedge \text{UNCHANGED } \langle loup, mouton, chou \rangle$
 $\wedge pasMiam'$

$bougeLoup \triangleq$

$\wedge loup = homme$
 $\wedge homme' = inv(homme)$

$$\begin{aligned}
& \wedge \textit{loup}' = \textit{inv}(\textit{loup}) \\
& \wedge \text{UNCHANGED } \langle \textit{mouton}, \textit{chou} \rangle \\
& \wedge \textit{pasMiam}'
\end{aligned}$$

$$\begin{aligned}
\textit{bougeMouton} & \triangleq \\
& \wedge \textit{mouton} = \textit{homme} \\
& \wedge \textit{homme}' = \textit{inv}(\textit{homme}) \\
& \wedge \textit{mouton}' = \textit{inv}(\textit{mouton}) \\
& \wedge \text{UNCHANGED } \langle \textit{loup}, \textit{chou} \rangle \\
& \wedge \textit{pasMiam}'
\end{aligned}$$

$$\begin{aligned}
\textit{bougeChou} & \triangleq \\
& \wedge \textit{chou} = \textit{homme} \\
& \wedge \textit{homme}' = \textit{inv}(\textit{homme}) \\
& \wedge \textit{chou}' = \textit{inv}(\textit{chou}) \\
& \wedge \text{UNCHANGED } \langle \textit{mouton}, \textit{loup} \rangle \\
& \wedge \textit{pasMiam}'
\end{aligned}$$

$$\textit{Next} \triangleq \textit{bougeHomme} \vee \textit{bougeLoup} \vee \textit{bougeMouton} \vee \textit{bougeChou}$$

$$\textit{Spec} \triangleq \textit{Init} \wedge \Box[\textit{Next}]_{\langle \textit{homme}, \textit{loup}, \textit{mouton}, \textit{chou} \rangle}$$
