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1  ┌────────────────────────── MODULE FischerPrefaceMC ───────────────────────────┐
    FischerPreface modified to be model checked.
    – Reals: replaced with Naturals
    – Real: replaced with Nat
    – Infinity: adding a CONSTANT Infinity (a model value)
8  EXTENDS Naturals

10  $Max(a, b) \triangleq \text{IF } a \geq b \text{ THEN } a \text{ ELSE } b$ 
11 ───────────────────────────────────────────────────────────────────────────────────┐
12 CONSTANTS Thread, Delta, Epsilon, Infinity

14 ASSUME
15      $\wedge Delta \in Nat$ 
16      $\wedge Epsilon \in Nat$ 
17      $\wedge 0 < Delta$ 
18      $\wedge Delta \leq Epsilon$ 

20  $NotAThread \triangleq \text{CHOOSE } t : t \notin Thread$ 
21 ───────────────────────────────────────────────────────────────────────────────────┐
22 VARIABLES x, pc, ubTimer, lbTimer, now, counter

24  $vars \triangleq \langle x, pc, ubTimer, lbTimer, now, counter \rangle$ 

26  $TypeOK \triangleq$ 
27      $\wedge x \in Thread \cup \{NotAThread\}$ 
28      $\wedge pc \in [Thread \rightarrow \{\text{"ncs"}, \text{"a"}, \text{"b"}, \text{"c"}, \text{"cs"}, \text{"d"}\}]$ 
29      $\wedge ubTimer \in [Thread \rightarrow Nat \cup \{Infinity\}]$ 
30      $\wedge lbTimer \in [Thread \rightarrow Nat \cup \{Infinity\}]$ 
31      $\wedge now \in Nat \setminus *now \text{ is unbounded}$ 
32      $\wedge counter \in [Thread \rightarrow Nat]$ 
33 ───────────────────────────────────────────────────────────────────────────────────┐
34  $Init \triangleq$ 
35      $\wedge x = NotAThread$ 
36      $\wedge pc = [t \in Thread \mapsto \text{"ncs"}]$ 
37      $\wedge ubTimer = [t \in Thread \mapsto Infinity]$ 
38      $\wedge lbTimer = [t \in Thread \mapsto 0]$ 
39      $\wedge now = 0$ 
40      $\wedge counter = [t \in Thread \mapsto 0]$ 
41 ───────────────────────────────────────────────────────────────────────────────────┐
42  $At(t, loc) \triangleq pc[t] = loc$ 

44  $GoTo(t, loc) \triangleq pc' = [pc \text{ EXCEPT } ![t] = loc]$ 

46  $GoFromTo(t, loc1, loc2) \triangleq$ 
47      $\wedge At(t, loc1)$ 
48      $\wedge GoTo(t, loc2)$ 

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50 TimedOut(t, timer)  $\triangleq$  timer[t] = 0
51 |-----|
52 MutualExclusion  $\triangleq$ 
53    $\forall t1, t2 \in Thread : (t1 \neq t2) \Rightarrow \neg At(t1, \text{"cs"}) \vee \neg At(t2, \text{"cs"})$ 
54 |-----|
   \ * Modification History
   \ * Last modified Sat Aug 07 15:59:41 CST 2021 by hengxin
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