MACHINE m3
REFINES m2
SEES c0
VARIABLES

    wait

    process

    clk

    t1

    t2

    t3

    position

    index

INVARIANTS

    inv3: $finite(ran(t3))$

    inv1: $\forall p \cdot p \in dom(t1) \Rightarrow p \in dom(index)$

    inv4: $\forall p \cdot (p \in dom(t1) \wedge p \in dom(t2) \wedge t2(p) \geq t1(p)) \Rightarrow t2(p) - t1(p) \leq index(p) * (ddl2 + ddl4) + ddl4$

EVENTS
Initialisation ⟨extended⟩

    begin

        act1: $wait := \varnothing$

        act2: $process := \varnothing$

        act3: $clk := 0$

        act4: $t1 := \varnothing$

        act5: $t2 := \varnothing$

        act6: $t3 := \varnothing$

        act7: $position := \varnothing$

        act8: $index := \varnothing$

    end

Event wish ⟨ordinary⟩ $\widehat{=}$
extends wish

    any

        pro

        pos

    where

        grd1: $pro \in PROCESS \setminus wait$

        grd2: $pro \in PROCESS \setminus process$

        grd3: $pos \in POSITION$

        grd4: $pos \notin ran(position)$

        grd7: $finite(ran(position))$

        grd6: $position \neq \varnothing \Rightarrow pos = max(ran(position)) + 1$

        grd8: $position = \varnothing \Rightarrow pos = 0$

    then

        act1: $wait := wait \cup \{pro\}$

        act2: $t1(pro) := clk$

        act3: $position := position \cup \{pro \mapsto pos\}$

        act4: $index(pro) := pos$

    end

Event enter ⟨ordinary⟩ $\widehat{=}$
extends enter

    any

        pro

    where

        grd1: $pro \in wait$

        grd2: $card(process) = 0$

        grd3: $pro \in dom(position)$

        grd4: $position(pro) = min(ran(position))$

then

      act1: $wait := wait \setminus \{pro\}$

      act2: $process := process \cup \{pro\}$

      act3: $t2(pro) := clk$

      act5: $position := \lambda p \cdot p \in wait \setminus \{pro\} | position(p) - 1$

end

Event leave $\langle$ordinary$\rangle \;\widehat{=}$

extends leave

  any

      pro

  where

      grd1: $pro \in process$

  then

      act1: $process := process \setminus \{pro\}$

      act3: $t3(pro) := clk$

  end

Event tick $\langle$ordinary$\rangle \;\widehat{=}$

extends tick

  when

      grd2: $\forall t, p \cdot (p \in wait \wedge p \in dom(t1) \wedge t = t1(p)) \Rightarrow clk + 1 - t \leq ddl1$

      grd4: $\forall t, p \cdot (p \in process \wedge p \in dom(t2) \wedge t = t2(p)) \Rightarrow clk + 1 - t \leq ddl2$

      grd5: $\forall p \cdot (process = \varnothing \wedge wait \neq \varnothing \wedge p \in dom(t1) \wedge t3 = \varnothing) \Rightarrow clk + 1 - t1(p) \leq ddl4$

      grd7: $\forall p \cdot (process = \varnothing \wedge wait \neq \varnothing \wedge p \in dom(t1) \wedge t3 \neq \varnothing) \Rightarrow clk + 1 - max(ran(t3)) \leq ddl4$

  then

      act1: $clk := clk + 1$

  end

END