MACHINE m2
REFINES m1
SEES c0
VARIABLES

wait
process
clk
t1
t2
t3
position
index
qsize

INVARIANTS

inv1: $\forall p \cdot (p \in process \land p \in dom(t2)) \Rightarrow clk - t2(p) \leq ddl2$
inv2: $\forall p \cdot (p \in dom(t2) \land p \in dom(t3) \land t3(p) \geq t2(p)) \Rightarrow t3(p) - t2(p) \leq ddl2$
deadline(t2,t3,ddl1)
inv3: $\forall t, p \cdot (p \in process \land p \in dom(t1) \land p \in dom(t2) \land t = t2(p) \land t2(p) \geq t1(p)) \Rightarrow t2(p) - t1(p) \leq ddl1$
inv4: $position \in 1 \,..\, qsize \rightarrowtail\!\!\!\!\!\rightarrow wait$
inv5: $index \in PROCESS \nrightarrow \mathbb{N}$
inv6: $qsize \in \mathbb{N}$

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: $index := \varnothing$
act9: $qsize := 0$

end

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

any

pro

where

grd1: $pro \in PROCESS \setminus wait$
grd2: $pro \in PROCESS \setminus process$

then

act1: $wait := wait \cup \{pro\}$
act2: $t1(pro) := clk$
act4: $index(pro) := qsize$
act3: $position(qsize + 1) := pro$
act5: $qsize := qsize + 1$

end

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

any

pro

where

grd1: $pro \in wait$
grd2: $card(process) = 0$

grd3: $qsize > 0$
grd4: $pro = position(1)$

then

act1: $wait := wait \setminus \{pro\}$
act2: $process := process \cup \{pro\}$
act3: $t2(pro) := clk$
act5: $position :| position' \in 1..qsize-1 \rightarrowtail wait \setminus \{position(1)\} \land (\forall i \cdot i \in 1..qsize-1 \Rightarrow position'(i) = position(i+1))$
act6: $qsize := qsize - 1$

end

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

any

pro

where

grd1: $pro \in process$

then

act1: $process := process \setminus \{pro\}$
act3: $t3(pro) := clk$

end

Event tick ⟨ordinary⟩ $\widehat{=}$
refines tick

when

grd2: $\forall p \cdot (p \in wait \land p \in dom(t1)) \Rightarrow clk + 1 - t1(p) \leq ddl1$
grd4: $\forall p \cdot (p \in process \land p \in dom(t2)) \Rightarrow clk + 1 - t2(p) \leq ddl2$

then

act1: $clk := clk + 1$

end

END