MACHINE m2
REFINES m1
SEES c0
VARIABLES

wait
process
clk
t1
t2
t3
position
index

INVARIANTS

inv1: $\forall t, p \cdot (p \in process \land p \in dom(t2) \land t = t2(p)) \Rightarrow clk - t \leq ddl2$
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: $position \in wait \rightarrowtail POSITION$
inv5: $index \in PROCESS \nrightarrow \mathbb{N}$

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: $index := \varnothing$

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

then

act1: $clk := clk + 1$

end

END