MACHINE CL_M0
SEES CL_C0
VARIABLES

line_sensor

can_enter

cashier_busy

cashier_sensor

INVARIANTS

inv1: $line\_sensor \in BOOL$
A person has walked past the entrance line

inv2: $can\_enter \in BOOL$
Signal that a cashier is free

inv3: $cashier\_busy \in 1 \mathinner{..} N\_DESK \to BOOL$
Whether a cashier is or not busy

inv4: $cashier\_sensor \in 1 \mathinner{..} N\_DESK \to BOOL$
Whether a person is entering a cashier

inv5:
$line\_sensor = TRUE \Rightarrow$
$(\exists x \cdot (x \in 1 \mathinner{..} N\_DESK \land cashier\_busy(x) = FALSE))$
If a person goes to the desk, there is a free cashier

inv6: $can\_enter = TRUE \Rightarrow (\exists x \cdot (x \in 1 \mathinner{..} N\_DESK \land cashier\_busy(x) = FALSE))$

inv7: $\exists x \cdot ((x \in 1 \mathinner{..} N\_DESK \land cashier\_sensor(x) = TRUE \land cashier\_busy(x) = FALSE) \Rightarrow can\_enter = FALSE)$
Aux.

inv8: $\exists x \cdot ((x \in 1 \mathinner{..} N\_DESK \land cashier\_sensor(x) = TRUE \land cashier\_busy(x) = FALSE) \Rightarrow line\_sensor = FALSE)$
Aux

EVENTS
Initialisation
begin

act1: $line\_sensor := FALSE$
act2: $can\_enter := FALSE$
act3: $cashier\_busy := 1 \mathinner{..} N\_DESK \times \{FALSE\}$
act6: $cashier\_sensor := 1 \mathinner{..} N\_DESK \times \{FALSE\}$

end

Event in_wait ⟨ordinary⟩ $\widehat{=}$
Person: waiting for desk
when

grd1: $can\_enter = TRUE$
Sign that we can enter
grd2: $line\_sensor = FALSE$
No one else in the corridor

then

act3: $line\_sensor := TRUE$
A person cannot make cam_enter false here...

end

Event in_payment ⟨ordinary⟩ $\widehat{=}$
Person: enter cashier
any

k

where

grd1: $line\_sensor = TRUE$
grd2: $k \in 1 \mathinner{..} N\_DESK$
grd3: $cashier\_sensor(k) = FALSE$
grd4: $cashier\_busy(k) = FALSE$

then

act1: $cashier\_sensor(k) := TRUE$
act3: $can\_enter := FALSE$

end

Event leave ⟨ordinary⟩ $\widehat{=}$

any

k

where

grd1: $k \in 1 \mathinner{..} N\_DESK$

Person: leave cashier after payment

grd2: $cashier\_sensor(k) = TRUE$
grd3: $cashier\_busy(k) = TRUE$

then

act1: $cashier\_sensor(k) := FALSE$

end

Event to_pay ⟨ordinary⟩ $\widehat{=}$

System: enter cashier to pay, mark it is busy, free line

any

k

where

grd1: $k \in 1 \mathinner{..} N\_DESK$
grd2: $cashier\_busy(k) = FALSE$
grd3: $cashier\_sensor(k) = TRUE$

then

act1: $cashier\_busy(k) := TRUE$
act3: $line\_sensor := FALSE$

There is no one in sight, so we need to stop people from entering

act4: $can\_enter := FALSE$

Person paying, we need to allow new clients aware that more can enter

end

Event to_leave ⟨ordinary⟩ $\widehat{=}$

System: finished paying, mark cashier is free again

any

k

where

grd1: $k \in 1 \mathinner{..} N\_DESK$
grd2: $cashier\_busy(k) = TRUE$
grd3: $cashier\_sensor(k) = FALSE$

then

act1: $cashier\_busy(k) := FALSE$

end

Event new client ⟨ordinary⟩ $\widehat{=}$

System: if no one in line and there are free cashiers, check if anyone can enter

when

grd1: $line\_sensor = FALSE$
grd2: $can\_enter = FALSE$
grd3: $\exists x \cdot (x \in 1 \mathinner{..} N\_DESK \land cashier\_busy(x) = FALSE \land cashier\_sensor(x) = FALSE)$

then

act1: $can\_enter := TRUE$

end

END