

MACHINE ClockShallow **REFINES** ShallowGenMch
SEES ClockShallowCtx
VARIABLES
 $m,$
 $h,$
 $InitDone$

INVARIANTS
 $inv1: s = pr(m \mapsto h) \ // \ Gluing \ Invariant$

EVENTS

INITIALISATION
WITH
 $s': s' = pr(m' \mapsto h')$
THEN
 $act1: m, h, InitDone : | m' \in \mathbb{Z} \wedge h' : \in \mathbb{Z} \wedge InitDone' = FALSE$
END

Do_Init REFINES Do_Init
WHERE
 $grd1: InitDone = FALSE$
 $grd2: pr[\{0 \mapsto 0\}] = AP(mch)$
WITH
 $s': s' = pr(m' \mapsto h')$
THEN
 $act1: m, h, InitDone : | pr(m' \mapsto h') \in AP(mch) \wedge$
 $InitDone = TRUE$
END

Tick_min REFINES Do_Convergent
WHERE
 $grd1: InitDone = TRUE \wedge pr(m \mapsto h) \in Grd(mch)[\{tick_min\}]$
 $grd2: pr[\{ms, hs \cdot ms < 59 \wedge hs \in \mathbb{Z} \mid ms \mapsto hs\}]$
 $= Grd(mch)[\{tick_min\}]$
 $grd3: \{ss, ssp, ms, hs, msp, hsp.$
 $ss = pr(ms \mapsto hs) \wedge ssp = pr(msp \mapsto hsp) \wedge$
 $msp = ms + 1 \wedge hs = hsp \mid ss \mapsto ssp\}$
 $= BAP(mch)[\{tick_min\}]$
WITH
 $e: e = tick_min, s': s' = pr(m' \mapsto h')$
THEN
 $act1: m, h : |$
 $pr(m' \mapsto h') \in BAP(mch)[\{tick_min\}][\{pr(m \mapsto h)\}]$
END

Tick_hour REFINES Do_Convergent
WHERE
 $grd1: InitDone = TRUE \wedge pr(m \mapsto h) \in Grd(mch)[\{tick_hour\}]$
 $grd2: pr[\{ms, hs \cdot ms < 23 \wedge ms = 59 \mid ms \mapsto hs\}]$
 $= Grd(mch)[\{tick_hour\}]$
 $grd3: \{ss, ssp, ms, hs, msp, hsp.$
 $ss = pr(ms \mapsto hs) \wedge ssp = pr(msp \mapsto hsp) \wedge$
 $msp = ms \wedge hsp = hs + 1 \mid ss \mapsto ssp\}$
 $= BAP(mch)[\{tick_hour\}]$
WITH
 $e: e = tick_hour, s': s' = pr(m' \mapsto h')$
THEN
 $act1: m, h : |$
 $pr(m' \mapsto h') \in BAP(mch)[\{tick_hour\}][\{pr(m \mapsto h)\}]$
END

Tick_midnight REFINES Do_Ordinary
WHERE
 $grd1: InitDone = TRUE \wedge$
 $pr(m \mapsto h) \in Grd(mch)[\{tick_midnight\}]$
 $grd2: pr[\{ms, hs \cdot ms = 59 \wedge hs = 23 \mid ms \mapsto hs\}]$
 $= Grd(mch)[\{tick_midnight\}]$
 $grd3: \{ss, ssp, ms, hs, msp, hsp.$
 $ss = pr(ms \mapsto hs) \wedge ssp = pr(msp \mapsto hsp) \wedge$
 $msp = 0 \wedge hsp = 0 \mid ss \mapsto ssp\}$
 $= BAP(mch)[\{tick_midnight\}]$
WITH
 $e: e = tick_midnight, s': s' = pr(m' \mapsto h')$
THEN
 $act1: m, h : |$
 $pr(m' \mapsto h') \in BAP(mch)[\{tick_midnight\}][\{pr(m \mapsto h)\}]$
END
END