MACHINE M_PartProc_With_Events
REFINES M_PartProc_Trans
SEES C_Part_Proc_With_Events
VARIABLES

partition_mode
processes
processes_of_partition
process_state
processes_of_cores
finished_core
location_of_service
create_process_parm
periodtype_of_process

INVARIANTS

inv_periodtype_of_proc: $periodtype\_of\_process \in processes \mathrel{+\!\!\!\!\rightarrow} PROC\_PERIOD\_TYPE$

EVENTS

Initialisation ⟨extended⟩

begin

act001: $partition\_mode := PARTITIONS \times \{PM\_COLD\_START\}$
act101: $processes := \varnothing$
act102: $processes\_of\_partition := \varnothing$
act103: $process\_state := \varnothing$
act104: $processes\_of\_cores := \varnothing$
act105: $finished\_core := CORES \times \{TRUE\}$
act106: $location\_of\_service := \varnothing$
act201: $periodtype\_of\_process := \varnothing$

end

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

any

part

where

grd001: $part \in PARTITIONS$
grd002: $partition\_mode(part) = PM\_NORMAL \lor partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START$

then

skip

end

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

any

part
proc
core

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes \cap dom(process\_state) \cap dom(processes\_of\_cores) \cap dom(processes\_of\_partition)$

grd003: $core \in CORES$
grd004: $processes\_of\_partition(proc) = part$
grd005: $core \in Cores\_of\_Partition(part)$
grd006: $processes\_of\_cores(proc) = core$
grd007: $partition\_mode(part) = PM\_NORMAL$
grd008: $process\_state(proc) = PS\_Ready \lor process\_state(proc) = PS\_Running$

then

skip

end

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

any

$part$
$proc$
$core$
$service$
ptype

where

grd001: $part \in PARTITIONS$
grd002: $proc \in (PROCESSES \setminus processes)$
grd003: $core \in CORES$
grd004: $service \in Services$
grd005: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START$

grd006: $finished\_core(core) = TRUE$
grd007: $service = Create\_Process$
grd101: $ptype \in PROC\_PERIOD\_TYPE$

then

act001: $location\_of\_service(core) := service \mapsto loc\_i$
act002: $finished\_core(core) := FALSE$
act003: $processes := processes \cup \{proc\}$
act004: $processes\_of\_partition(proc) := part$
act005: $create\_process\_parm(core) := proc$
act101: $periodtype\_of\_process(proc) := ptype$

end

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

any

$part$
$proc$
$core$

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes$
grd003: $core \in CORES \cap dom(location\_of\_service)$
grd004: $location\_of\_service(core) = Create\_Process \mapsto loc\_i$
grd005: $finished\_core(core) = FALSE$
grd006: $\neg(location\_of\_service(core) = Create\_Process \mapsto loc\_i \land finished\_core(core) = FALSE)$
grd007: $proc = create\_process\_parm(core)$
grd008: $processes\_of\_partition(proc) = part$
grd009: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START$

then

act001: $location\_of\_service(core) := Create\_Process \mapsto loc\_1$
act002: $process\_state(proc) := PS\_Dormant$

end

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

any

$part$
$proc$
$core$

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes$
grd003: $core \in CORES \cap dom(location\_of\_service)$
grd004: $location\_of\_service(core) = Create\_Process \mapsto loc\_1$
grd005: $finished\_core(core) = FALSE$

grd006: $\neg(location\_of\_service(core) = Create\_Process \mapsto loc\_1 \land finished\_core(core) = FALSE)$
grd007: $processes\_of\_partition(proc) = part$
grd008: $process\_state(proc) = PS\_Dormant$
grd009: $create\_process\_parm(core) = proc$
grd010: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START$

then
act001: $location\_of\_service(core) := Create\_Process \mapsto loc\_2$
act002: $processes\_of\_cores(proc) := core$
end

Event create_process_return ⟨ordinary⟩ $\widehat{=}$
extends create_process_return
any
$part$
$proc$
$core$
where
grd001: $part \in PARTITIONS$
grd002: $proc \in processes$
grd003: $core \in CORES \cap dom(location\_of\_service)$
grd004: $location\_of\_service(core) = Create\_Process \mapsto loc\_2$
grd005: $finished\_core(core) = FALSE$
grd006: $\neg(location\_of\_service(core) = Create\_Process \mapsto loc\_2 \land finished\_core(core) = FALSE)$
grd007: $processes\_of\_partition(proc) = part$
grd008: $process\_state(proc) = PS\_Dormant$
grd009: $create\_process\_parm(core) = proc$
grd010: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START$

then
act001: $location\_of\_service(core) := Create\_Process \mapsto loc\_r$
act002: $finished\_core(core) := TRUE$
act003: $create\_process\_parm := \{core\} ⩤ create\_process\_parm$
end

Event set_partition_mode_to_idle ⟨ordinary⟩ $\widehat{=}$
extends partition_modetransition_to_idle
any
$part$
$newm$
$procs$
$cores$
where
grd001: $part \in PARTITIONS$
grd002: $newm \in PARTITION\_MODES$
grd101: $procs = processes\_of\_partition^{-1}[\{part\}]$
grd102: $cores \in \mathbb{P}_1(CORES)$
grd103: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START \lor partition\_mode(part) = PM\_NORMAL$
grd104: $newm = PM\_IDLE$
grd105: $cores = Cores\_of\_Partition(part)$
grd106: $\forall core \cdot (core \in (Cores\_of\_Partition(part) \cap dom(finished\_core)) \Rightarrow finished\_core(core) = TRUE)$
then
act001: $partition\_mode(part) := newm$
act101: $processes := processes \setminus procs$
act102: $process\_state := procs ⩤ process\_state$
act103: $processes\_of\_partition := procs ⩤ processes\_of\_partition$
act104: $processes\_of\_cores := procs ⩤ processes\_of\_cores$
act201: $periodtype\_of\_process := procs ⩤ periodtype\_of\_process$
end

Event set_partition_mode_to_normal_init ⟨ordinary⟩ $\widehat{=}$
extends partition_modetransition_to_normal_init

- **any**
  - *part*
  - *core*
  - *service*
- **where**
  - grd001: $part \in PARTITIONS$
  - grd002: $core \in CORES$
  - grd003: $service \in Services$
  - grd004: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START$
  - grd005: $finished\_core(core) = TRUE$
  - grd006: $service = Set\_Normal$
- **then**
  - act001: $location\_of\_service(core) := service \mapsto loc\_i$
  - act002: $finished\_core(core) := FALSE$
- **end**

Event set_partition_mode_to_normal_mode ⟨ordinary⟩ $\widehat{=}$
extends partition_modetransition_to_normal_mode

- **any**
  - *part*
  - *newm*
  - *core*
- **where**
  - grd001: $part \in PARTITIONS$
  - grd002: $newm \in PARTITION\_MODES$
  - grd101: $core \in CORES \cap dom(location\_of\_service)$
  - grd102: $newm = PM\_NORMAL$
  - grd103: $finite(processes\_of\_partition^{-1}[\{part\}]) \land card(processes\_of\_partition^{-1}[\{part\}]) > 0$
  - grd104: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START$
  - grd105: $location\_of\_service(core) = Set\_Normal \mapsto loc\_i$
  - grd106: $finished\_core(core) = FALSE$
  - grd107: $\neg(location\_of\_service(core) = Set\_Normal \mapsto loc\_i \land finished\_core(core) = FALSE)$
- **then**
  - act001: $location\_of\_service(core) := Set\_Normal \mapsto loc\_1$
  - act002: $partition\_mode(part) := newm$
- **end**

Event set_partition_mode_to_normal_ready ⟨ordinary⟩ $\widehat{=}$
extends partition_modetransition_to_normal_ready

- **any**
  - *part*
  - *procs*
  - *procs2*
  - *procsstate*
  - *core*
- **where**
  - grd001: $part \in PARTITIONS$
  - grd002: $partition\_mode(part) = PM\_NORMAL$
  - grd003: $procs = processes\_of\_partition^{-1}[\{part\}] \cap process\_state^{-1}[\{PS\_Waiting\}]$
  - grd004: $procs2 = processes\_of\_partition^{-1}[\{part\}] \cap process\_state^{-1}[\{PS\_WaitandSuspend\}]$
  - grd005: $procsstate \in procs \to \{PS\_Waiting, PS\_Ready\}$
  - grd006: $core \in CORES \cap dom(location\_of\_service)$
  - grd007: $location\_of\_service(core) = Set\_Normal \mapsto loc\_1$
  - grd008: $finished\_core(core) = FALSE$
  - grd009: $\neg(location\_of\_service(core) = Set\_Normal \mapsto loc\_1 \land finished\_core(core) = FALSE)$
- **then**
  - act001: $location\_of\_service(core) := Set\_Normal \mapsto loc\_2$

act002: $process\_state := (process\_state \mathbin{\lhd\mkern-9mu+} procsstate) \mathbin{\lhd\mkern-9mu+} (procs2 \times \{PS\_Suspend\})$

end

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

extends partition_modetransition_to_normal_return

any

$part$

$core$

where

grd001: $part \in PARTITIONS$

grd002: $partition\_mode(part) = PM\_NORMAL$

grd003: $core \in CORES \cap dom(location\_of\_service)$

grd004: $location\_of\_service(core) = Set\_Normal \mapsto loc\_2$

grd005: $finished\_core(core) = FALSE$

grd006: $\neg(location\_of\_service(core) = Set\_Normal \mapsto loc\_2 \land finished\_core(core) = FALSE)$

then

act001: $location\_of\_service(core) := Set\_Normal \mapsto loc\_r$

act002: $finished\_core(core) := TRUE$

end

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

extends partition_modetransition_to_coldstart

any

$part$

$newm$

$procs$

$cores$

where

grd001: $part \in PARTITIONS$

grd002: $newm \in PARTITION\_MODES$

grd101: $cores \in \mathbb{P}_1(CORES)$

grd102: $newm = PM\_COLD\_START$

grd103: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START \lor partition\_mode(part) = PM\_NORMAL$

grd107: $part \in ran(processes\_of\_partition)$

grd104: $procs = processes\_of\_partition^{-1}[\{part\}]$

grd105: $cores = Cores\_of\_Partition(part)$

grd106: $\forall core \cdot (core \in (Cores\_of\_Partition(part) \cap dom(finished\_core)) \Rightarrow finished\_core(core) = TRUE)$

then

act001: $partition\_mode(part) := newm$

act101: $processes := processes \setminus procs$

act102: $process\_state := procs \mathbin{\lhd\mkern-14mu-} process\_state$

act103: $processes\_of\_partition := procs \mathbin{\lhd\mkern-14mu-} processes\_of\_partition$

act104: $processes\_of\_cores := procs \mathbin{\lhd\mkern-14mu-} processes\_of\_cores$

act201: $periodtype\_of\_process := procs \mathbin{\lhd\mkern-14mu-} periodtype\_of\_process$

end

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

extends partition_modetransition_to_warmstart

any

$part$

$newm$

$procs$

$cores$

where

grd001: $part \in PARTITIONS$

grd002: $newm \in PARTITION\_MODES$

grd101: $cores \in \mathbb{P}_1(CORES)$

grd102: $newm = PM\_WARM\_START$

grd103: $partition\_mode(part) = PM\_WARM\_START \lor partition\_mode(part) = PM\_NORMAL$

grd104: $procs = processes\_of\_partition^{-1}[\{part\}]$

grd105: $cores = Cores\_of\_Partition(part)$

grd106: $\forall core\cdot(core \in (Cores\_of\_Partition(part) \cap dom(finished\_core)) \Rightarrow finished\_core(core) = TRUE)$

then

act001: $partition\_mode(part) := newm$

act101: $processes := processes \setminus procs$

act102: $process\_state := procs ⩤ process\_state$

act103: $processes\_of\_partition := procs ⩤ processes\_of\_partition$

act104: $processes\_of\_cores := procs ⩤ processes\_of\_cores$

act201: $periodtype\_of\_process := procs ⩤ periodtype\_of\_process$

end

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

extends partition_modetransition_idle_to_warmstart

any

$part$

$newm$

$cores$

where

grd001: $part \in PARTITIONS$

grd002: $newm \in PARTITION\_MODES$

grd101: $cores \in \mathbb{P}_1(CORES)$

grd102: $newm = PM\_WARM\_START$

grd103: $partition\_mode(part) = PM\_IDLE$

grd104: $cores = Cores\_of\_Partition(part)$

grd105: $\forall core\cdot(core \in (Cores\_of\_Partition(part) \cap dom(finished\_core)) \Rightarrow finished\_core(core) = TRUE)$

then

act001: $partition\_mode(part) := newm$

end

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

extends partition_modetransition_idle_to_coldstart

any

$part$

$newm$

$cores$

where

grd001: $part \in PARTITIONS$

grd002: $newm \in PARTITION\_MODES$

grd101: $cores \in \mathbb{P}_1(CORES)$

grd102: $newm = PM\_COLD\_START$

grd103: $partition\_mode(part) = PM\_IDLE$

grd104: $cores = Cores\_of\_Partition(part)$

grd105: $\forall core\cdot(core \in (Cores\_of\_Partition(part) \cap dom(finished\_core)) \Rightarrow finished\_core(core) = TRUE)$

then

act001: $partition\_mode(part) := newm$

end

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

refines process_state_transition

any

part

proc

newstate

core

where

grd001: $part \in PARTITIONS$

grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state) \cap dom(periodtype\_of\_process)$

```
          grd003:  newstate ∈ PROCESS_STATES
          grd004:  core ∈ CORES
          grd005:  processes_of_partition(proc) = part
          grd101:  partition_mode(part) = PM_NORMAL
          grd102:  process_state(proc) = PS_Running
          grd103:  newstate = PS_Suspend
          grd104:  periodtype_of_process(proc) = APERIOD_PROC
     then
          act001: process_state(proc) := newstate
     end
Event suspend ⟨ordinary⟩ ≙
refines process_state_transition
     any
          part
          proc
          newstate
          core
     where
          grd001:  part ∈ PARTITIONS
          grd002:  proc ∈ processes∩dom(processes_of_partition)∩dom(process_state)∩dom(periodtype_of_process)

          grd003:  newstate ∈ PROCESS_STATES
          grd004:  core ∈ CORES
          grd005:  processes_of_partition(proc) = part
          grd006:  partition_mode(part) = PM_COLD_START∨partition_mode(part) = PM_WARM_START∨
             partition_mode(part) = PM_NORMAL
          grd101:  partition_mode(part) = PM_NORMAL⇒(process_state(proc) = PS_Ready∧newstate =
             PS_Suspend) ∨ (process_state(proc) = PS_Waiting ∧ newstate = PS_WaitandSuspend)
          grd102:  partition_mode(part) = PM_COLD_START∨partition_mode(part) = PM_WARM_START⇒
             (process_state(proc) = PS_Waiting ∧ newstate = PS_WaitandSuspend)
          grd103:  periodtype_of_process(proc) = APERIOD_PROC
     then
          act001: process_state(proc) := newstate
     end
Event resume ⟨ordinary⟩ ≙
refines process_state_transition
     any
          part
          proc
          newstate
          core
     where
          grd001:  part ∈ PARTITIONS
          grd002:  proc ∈ processes∩dom(processes_of_partition)∩dom(process_state)∩dom(periodtype_of_process)

          grd003:  newstate ∈ PROCESS_STATES
          grd004:  core ∈ CORES
          grd005:  processes_of_partition(proc) = part
          grd006:  partition_mode(part) = PM_COLD_START∨partition_mode(part) = PM_WARM_START∨
             partition_mode(part) = PM_NORMAL
          grd101:  partition_mode(part) = PM_NORMAL⇒(process_state(proc) = PS_Suspend∧newstate =
             PS_Ready) ∨ (process_state(proc) = PS_WaitandSuspend ∧ newstate = PS_Waiting)
          grd102:  partition_mode(part) = PM_COLD_START∨partition_mode(part) = PM_WARM_START⇒
             (process_state(proc) = PS_WaitandSuspend ∧ newstate = PS_Waiting)
          grd103:  periodtype_of_process(proc) = APERIOD_PROC
     then
          act001: process_state(proc) := newstate
     end
Event stop_self ⟨ordinary⟩ ≙
```

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$
grd003: $newstate \in PROCESS\_STATES$
grd004: $core \in CORES$
grd005: $processes\_of\_partition(proc) = part$
grd101: $partition\_mode(part) = PM\_NORMAL$
grd102: $process\_state(proc) = PS\_Running \land newstate = PS\_Dormant$

then

act001: $process\_state(proc) := newstate$

end

Event stop ⟨ordinary⟩ $\widehat{=}$

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$
grd003: $newstate \in PROCESS\_STATES$
grd004: $core \in CORES$
grd005: $processes\_of\_partition(proc) = part$
grd006: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START \lor partition\_mode(part) = PM\_NORMAL$
grd101: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START \Rightarrow ((process\_state(proc) = PS\_Waiting \lor process\_state(proc) = PS\_WaitandSuspend) \land newstate = PS\_Dormant)$
grd102: $partition\_mode(part) = PM\_NORMAL \Rightarrow ((process\_state(proc) = PS\_Ready \lor process\_state(proc) = PS\_Waiting \lor process\_state(proc) = PS\_WaitandSuspend \lor process\_state(proc) = PS\_Suspend \lor process\_state(proc) = PS\_Faulted) \land newstate = PS\_Dormant)$

then

act001: $process\_state(proc) := newstate$

end

Event start ⟨ordinary⟩ $\widehat{=}$

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state) \cap dom(periodtype\_of\_process)$

grd003: $newstate \in PROCESS\_STATES$
grd004: $core \in CORES$
grd005: $processes\_of\_partition(proc) = part$
grd006: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START \lor partition\_mode(part) = PM\_NORMAL$
grd101: $partition\_mode(part) = PM\_COLD\_START \lor partition\_mode(part) = PM\_WARM\_START \Rightarrow (process\_state(proc) = PS\_Dormant \land newstate = PS\_Waiting)$

grd102: $partition\_mode(part) = PM\_NORMAL \Rightarrow (process\_state(proc) = PS\_Dormant \wedge ((periodtype\_of\_process(p$
$APERIOD\_PROC \Rightarrow newstate = PS\_Ready) \wedge (periodtype\_of\_process(proc) = PERIOD\_PROC \Rightarrow$
$newstate = PS\_Waiting)))$

then

act001: $process\_state(proc) := newstate$

end

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

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$
grd003: $newstate \in PROCESS\_STATES$
grd004: $core \in CORES$
grd005: $processes\_of\_partition(proc) = part$
grd006: $partition\_mode(part) = PM\_COLD\_START \vee partition\_mode(part) = PM\_WARM\_START \vee$
$partition\_mode(part) = PM\_NORMAL$
grd101: $partition\_mode(part) = PM\_COLD\_START \vee partition\_mode(part) = PM\_WARM\_START \Rightarrow$
$(process\_state(proc) = PS\_Dormant \wedge newstate = PS\_Waiting)$
grd102: $partition\_mode(part) = PM\_NORMAL \Rightarrow (process\_state(proc) = PS\_Dormant \wedge newstate =$
$PS\_Waiting)$

then

act001: $process\_state(proc) := newstate$

end

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

new!! running –> faulted

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$
grd003: $newstate \in PROCESS\_STATES$
grd004: $core \in CORES$
grd005: $processes\_of\_partition(proc) = part$
grd101: $partition\_mode(part) = PM\_NORMAL$
grd102: $process\_state(proc) = PS\_Running \wedge newstate = PS\_Faulted$

then

act001: $process\_state(proc) := newstate$

end

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

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$
grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$
grd003: $newstate \in PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $processes\_of\_partition(proc) = part$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $process\_state(proc) = PS\_Running \land (newstate = PS\_Ready \lor newstate = PS\_Waiting)$

then

act001: $process\_state(proc) := newstate$

end

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

refines process_state_transition

any

part

proc

newstate

core

where

grd001: $part \in PARTITIONS$

grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$

grd003: $newstate \in PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $processes\_of\_partition(proc) = part$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $process\_state(proc) = PS\_Running \land newstate = PS\_Waiting$

then

act001: $process\_state(proc) := newstate$

end

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

refines process_state_transition

any

part

proc

newstate

core

where

grd001: $part \in PARTITIONS$

grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$

grd003: $newstate \in PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $processes\_of\_partition(proc) = part$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $process\_state(proc) = PS\_Running \land (newstate = PS\_Waiting \lor newstate = PS\_Dormant)$

then

act001: $process\_state(proc) := newstate$

end

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

refines process_state_transition

any

part

proc

newstate

core

where

grd001: $part \in PARTITIONS$

grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$

grd003: $newstate \in PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $processes\_of\_partition(proc) = part$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $process\_state(proc) = PS\_Waiting \lor process\_state(proc) = PS\_Suspend \lor process\_state(proc) = PS\_WaitandSuspend$

grd103: $process\_state(proc) = PS\_Waiting \lor process\_state(proc) = PS\_Suspend \Rightarrow newstate = PS\_Ready$

grd104: $process\_state(proc) = PS\_WaitandSuspend \Rightarrow newstate = PS\_Suspend$

then

act001: $process\_state(proc) := newstate$

end

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

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$

grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$

grd003: $newstate \in PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $processes\_of\_partition(proc) = part$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $process\_state(proc) = PS\_Running$

grd103: $newstate = PS\_Waiting$

then

act001: $process\_state(proc) := newstate$

end

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

refines process_state_transition

any

part
proc
newstate
core

where

grd001: $part \in PARTITIONS$

grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state)$

grd003: $newstate \in PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $processes\_of\_partition(proc) = part$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $process\_state(proc) = PS\_Waiting \lor process\_state(proc) = PS\_WaitandSuspend$

grd103: $process\_state(proc) = PS\_Waiting \Rightarrow newstate = PS\_Ready$

grd104: $process\_state(proc) = PS\_WaitandSuspend \Rightarrow newstate = PS\_Suspend$

then

act001: $process\_state(proc) := newstate$

end

Event resource_become_available2 ⟨ordinary⟩ $\widehat{=}$

refines process_state_transition2

any

part
procs
newstates
core

where

grd001: $part \in PARTITIONS$

grd002: $procs \subseteq processes \cap dom(process\_state)$

grd003: $newstates \in procs \rightarrow PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $procs \subseteq processes\_of\_partition^{-1}[\{part\}]$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $\forall proc\cdot(proc \in procs \Rightarrow process\_state(proc) = PS\_Waiting \lor process\_state(proc) = PS\_WaitandSuspend)$

grd103: $\forall proc\cdot(proc \in procs \land process\_state(proc) = PS\_Waiting \Rightarrow newstates(proc) = PS\_Ready)$

grd104: $\forall proc\cdot(proc \in procs \land process\_state(proc) = PS\_WaitandSuspend \Rightarrow newstates(proc) = PS\_Suspend)$

then

act001: $process\_state := process\_state \mathbin{<\!\!\!+} newstates$

end

Event periodicproc_reach_releasepoint $\langle$ordinary$\rangle$ $\widehat{=}$

refines process_state_transition

any

part

proc

newstate

core

where

grd001: $part \in PARTITIONS$

grd002: $proc \in processes \cap dom(processes\_of\_partition) \cap dom(process\_state) \cap dom(periodtype\_of\_process)$

grd003: $newstate \in PROCESS\_STATES$

grd004: $core \in CORES$

grd005: $processes\_of\_partition(proc) = part$

grd101: $partition\_mode(part) = PM\_NORMAL$

grd102: $periodtype\_of\_process(proc) = PERIOD\_PROC$

grd103: $process\_state(proc) = PS\_Waiting$

grd104: $newstate = PS\_Ready$

then

act001: $process\_state(proc) := newstate$

end

END