

context Ctx_PartProc_Manage

```
/* *****  
// The Event-B model of ARINC 653 Part 1  
// Created by Yongwang Zhao ( zhaoyongwang@gmail.com)  
// National Key Laboratory of Software Development Environment (NLSDE)  
// School of Computer and Engineering, Beihang University, Beijing, China  
// *****/
```

extends Ctx_PartProc_with_Events

sets CRITILITY_LEVELS DEADLINE_TYPE PARTITION_STARTCONDITIONS PROCESS_WAIT_TYPES

constants

Period_of_Partition

/ defines the activation period of the partition, and is used to determine the partition's runtime placement within the core module's overall time frame. */*

Duration_of_Partition *// the amount of processor time given to the partition every period of the partition.*

SystemPartFlag_of_Partition

NORMAL_START PARTITION_RESTART HM_MODULE_RESTART

HM_PARTITION_RESTART *// reasons the partition is started*

DEADLINE_HARD DEADLINE_SOFT

PROC_WAIT_DELAY PROC_WAIT_TIMEOUT PROC_WAIT_PERIOD PROC_WAIT_OBJ

PROC_WAIT_PARTITIONNORMAL *//if a process is in WAITING state, the reasons of the WAITING, WAIT_OBJ means semaphore, event, etc.*

partitionTimeWindows

timeWindowsofPartition

periodicprocstart_timeWindow_of_Partition *//partition time windows with the periodic proc start is TRUE, of each partition*

firstperiodicprocstart_timeWindow_of_Partition *//partition time windows with the periodic proc start is TRUE, of each partition*

majorFrame *// the total time of all partitions*

MAX_LOCK_LEVEL *// max value of lock levels*

MIN_PRIORITY_VALUE MAX_PRIORITY_VALUE

INFINITE_TIME_VALUE

ONE_TICK_TIME

axioms

@axm_periodofpart **Period_of_Partition** \in **PARTITIONS** $\rightarrow \mathbb{N}$

@axm_durationofpart **Duration_of_Partition** \in **PARTITIONS** $\rightarrow \mathbb{N}$

@axm_syspart_flag **SystemPartFlag_of_Partition** \in **PARTITIONS** \rightarrow **BOOL**

@axm_partition_deadlinetype partition(**DEADLINE_TYPE**, {**DEADLINE_HARD**}, {**DEADLINE_SOFT**})

@axm_partition_startcondition partition(**PARTITION_STARTCONDITIONS**, {**NORMAL_START**},
{**PARTITION_RESTART**}, {**HM_MODULE_RESTART**}, {**HM_PARTITION_RESTART**})

@axm_partition_procwaittype partition(**PROCESS_WAIT_TYPES**, {**PROC_WAIT_DELAY**},
{**PROC_WAIT_TIMEOUT**}, {**PROC_WAIT_PERIOD**}, {**PROC_WAIT_OBJ**}, {**PROC_WAIT_PARTITIONNORMAL**})

@axm_parttimewin **partitionTimeWindows** $\in (\mathbb{N} \times \mathbb{N}) \rightarrow \mathbf{BOOL}$ // each $\langle x \mid \rightarrow y \rangle \mid \rightarrow b$: , x is the offset and y is the duration, b is the PeriodicProcessingStart flag

@axm_timewindowsofpar **timeWindowsofPartition** \in **partitionTimeWindows** \rightarrow **PARTITIONS** // total surjection: in a major frame, each partition should have one or more than one scheduling frame

@axm_majorframe **majorFrame** $\in \mathbb{N}1$ // majorFrame should be larger than sum of all schedulingframe. there may be spare time space between scheduling frames

@axm_perprocstart_tmwin **periodicprocstart_timeWindow_of_Partition** \in **partitionTimeWindows** \Rightarrow

PARTITIONS

@axm_fstperprocstart_tmwin **firstperiodicprocstart_timeWindow_of_Partition** \in **PARTITIONS** \rightarrow **partitionTimeWindows** //total injection, each partition has the only one first periodic proc start window

@axm_maxvalue_locklevel **MAX_LOCK_LEVEL** = 32 // according to ARINC653

@axm_minpriorityvalue **MIN_PRIORITY_VALUE** = 0 *// according to ARINC653*

@axm_maxpriorityvalue **MAX_PRIORITY_VALUE** = 249 *// according to ARINC653*

@axm_inf_timevalue **INFINITE_TIME_VALUE** = -1 *// according to ARINC653*

@axm_oneticktime **ONE_TICK_TIME** = 20 *// unit:ms. this is also the timer interrupt interval*

end