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An Event-B Specification of Core_SW @ Date: 31 Oct 2008 @ Time: 01:29:57 PM
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MACHINE Core_SW

REFINES TCTM_flow

SEES Core_SW_context

VARIABLES

TCbuffer
TMbuffer
TCpool
TMpool
TCstatus
csw_hk_on
csw_sci_on

INVARIANTS

inv1 : *csw_hk_on* \in *BOOL*
inv2 : *csw_sci_on* \in *BOOL*

EVENTS

INITIALISATION

BEGIN

act1 : *TCbuffer* := \emptyset
act2 : *TMbuffer* := \emptyset
act3 : *TCpool* := \emptyset
act4 : *TMpool* := \emptyset
act5 : *TCstatus* := \emptyset
act6 : *csw_hk_on* := *FALSE*
act7 : *csw_sci_on* := *FALSE*

END

EVENT env_Receive_TC

REFINES env_Receive_TC

ANY

tc
tc_pointer

WHERE

grd1 : *tc* \in *TC_SET*
grd2 : *tc_pointer* \in *TC_BUFFER_ADDRESSES*
grd3 : *tc_pointer* \notin *dom(TCbuffer)*

THEN

act1 : *TCbuffer*(*tc_pointer*) := *tc*

END

EVENT Poll_TC

REFINES Poll_TC

ANY

tc_pointer
tc_handler

WHERE

$grd1 : tc_pointer \in dom(TCbuffer)$
 $grd2 : tc_handler \in TCTM_POOL_ADDRESSES$
 $grd3 : tc_handler \notin dom(TCpool)$
 $grd4 : tc_handler \notin dom(TMpool)$

THEN

$act1 : TCpool(tc_handler) := TCbuffer(tc_pointer)$
 $act3 : TCstatus(tc_handler) := Unchecked$
 $act2 : TCbuffer := \{tc_pointer\} \triangleleft TCbuffer$

END**EVENT Report_TC_check_ok****REFINES** Report_TC_check_ok**ANY**

$tc_handler$
 $tm_handler$
 tm

WHERE

$grd1 : tc_handler \in dom(TCpool)$
 $grd2 : tm_handler \in TCTM_POOL_ADDRESSES$
 $grd3 : tm \in TM_SET$
 $grd4 : tm_handler \notin dom(TCpool)$
 $grd5 : tm_handler \notin dom(TMpool)$
 $grd6 : TCstatus(tc_handler) = Unchecked$
 $grd7 : Valid_TC(TCpool(tc_handler)) = TRUE$
 $grd8 : Type_of_TM(tm) = Check_ok_TM$

THEN

$act1 : TCstatus(tc_handler) := Waiting_for_Execution$
 $act2 : TMpool(tm_handler) := tm$

END**EVENT Report_TC_check_fail****REFINES** Report_TC_check_fail**ANY**

$tc_handler$
 $tm_handler$
 tm

WHERE

$grd1 : tc_handler \in dom(TCpool)$
 $grd2 : tm_handler \in TCTM_POOL_ADDRESSES$
 $grd3 : tm \in TM_SET$
 $grd4 : tm_handler \notin dom(TCpool)$
 $grd5 : tm_handler \notin dom(TMpool)$
 $grd6 : TCstatus(tc_handler) = Unchecked$
 $grd7 : Valid_TC(TCpool(tc_handler)) = FALSE$
 $grd8 : Type_of_TM(tm) = Check_fail_TM$

THEN

$act1 : TCpool := \{tc_handler\} \triangleleft TCpool$
 $act3 : TCstatus := \{tc_handler\} \triangleleft TCstatus$
 $act2 : TMpool(tm_handler) := tm$

END**EVENT TC_Execution_Mode_change****REFINES** TC_Execution_Success**ANY**

$tc_handler$

WHERE

```

    grd1 : tc_handler ∈ dom(TCpool)
    grd2 : TCstatus(tc_handler) = Waiting_for_Execution
    grd3 : Type_of_TC(TCpool(tc_handler)) ∈ MODE_CHANGING_TC
  THEN
    act1 : TCstatus(tc_handler) := Successfully_Executed
  END

```

EVENT TC_Execution_HK_on**REFINES** *TC_Execution_Success*

```

  ANY
    tc_handler
  WHERE
    grd1 : tc_handler ∈ dom(TCpool)
    grd2 : TCstatus(tc_handler) = Waiting_for_Execution
    grd3 : Type_of_TC(TCpool(tc_handler)) = HK_on_TC
  THEN
    act1 : TCstatus(tc_handler) := Successfully_Executed
    act2 : csw_hk_on := TRUE
  END

```

EVENT TC_Execution_HK_off**REFINES** *TC_Execution_Success*

```

  ANY
    tc_handler
  WHERE
    grd1 : tc_handler ∈ dom(TCpool)
    grd2 : TCstatus(tc_handler) = Waiting_for_Execution
    grd3 : Type_of_TC(TCpool(tc_handler)) = HK_off_TC
  THEN
    act1 : TCstatus(tc_handler) := Successfully_Executed
    act2 : csw_hk_on := FALSE
  END

```

EVENT TC_Execution_SCI_on**REFINES** *TC_Execution_Success*

```

  ANY
    tc_handler
  WHERE
    grd1 : tc_handler ∈ dom(TCpool)
    grd2 : TCstatus(tc_handler) = Waiting_for_Execution
    grd3 : Type_of_TC(TCpool(tc_handler)) = SCI_on_TC
  THEN
    act1 : TCstatus(tc_handler) := Successfully_Executed
    act2 : csw_sci_on := TRUE
  END

```

EVENT TC_Execution_SCI_off**REFINES** *TC_Execution_Success*

```

  ANY
    tc_handler
  WHERE
    grd1 : tc_handler ∈ dom(TCpool)
    grd2 : TCstatus(tc_handler) = Waiting_for_Execution
    grd3 : Type_of_TC(TCpool(tc_handler)) = SCI_off_TC
  THEN
    act1 : TCstatus(tc_handler) := Successfully_Executed
    act2 : csw_sci_on := FALSE
  END

```

END

EVENT Reset_Output_Buffer

REFINES Reset_Output_Buffer

ANY

tc_handler

WHERE

grd1 : *tc_handler* $\in \text{dom}(TCpool)$

grd2 : *TCstatus*(*tc_handler*) = *Waiting_for_Execution*

grd3 : *Type_of_TC*(*TCpool*(*tc_handler*)) = *TM_Buffer_Reset_TC*

THEN

act1 : *TMbuffer* := \emptyset

act2 : *TCstatus*(*tc_handler*) := *Successfully_Executed*

END

EVENT TC_Execution_Failure

REFINES TC_Execution_Failure

ANY

tc_handler

WHERE

grd1 : *tc_handler* $\in \text{dom}(TCpool)$

grd2 : *TCstatus*(*tc_handler*) = *Waiting_for_Execution*

THEN

act1 : *TCstatus*(*tc_handler*) := *Execution_Failed*

END

EVENT Report_TC_execution_success

REFINES Report_TC_execution_success

ANY

tc_handler

tm_handler

tm

WHERE

grd1 : *tc_handler* $\in \text{dom}(TCpool)$

grd2 : *tm_handler* $\in TCTM_POOL_ADDRESSES$

grd3 : *tm* $\in TM_SET$

grd4 : *TCstatus*(*tc_handler*) = *Successfully_Executed*

grd5 : *tm_handler* $\notin \text{dom}(TCpool)$

grd6 : *tm_handler* $\notin \text{dom}(TMpool)$

grd7 : *Type_of_TM*(*tm*) = *Exec_ok_TM*

THEN

act1 : *TCpool* := {*tc_handler*} $\triangleleft TCpool$

act2 : *TCstatus* := {*tc_handler*} $\triangleleft TCstatus$

act3 : *TMpool*(*tm_handler*) := *tm*

END

EVENT Report_TC_execution_failure

REFINES Report_TC_execution_failure

ANY

tc_handler

tm_handler

tm

WHERE

grd1 : *tc_handler* $\in \text{dom}(TCpool)$

grd2 : *tm_handler* $\in TCTM_POOL_ADDRESSES$

grd3 : *tm* $\in TM_SET$

grd4 : *TCstatus*(*tc_handler*) = *Execution_Failed*

```

    grd5 : tm_handler  $\notin \text{dom}(TCpool)$ 
    grd6 : tm_handler  $\notin \text{dom}(TMpool)$ 
    grd7 : Type_of_TM(tm) = Exec_fail_TM
  THEN
    act1 : TCpool := {tc_handler}  $\triangleleft TCpool$ 
    act2 : TCstatus := {tc_handler}  $\triangleleft TCstatus$ 
    act3 : TMpool(tm_handler) := tm
  END

```

EVENT Store_HK_Data**REFINES** Store_Data

```

  ANY
    tm_handler
    tm
  WHERE
    grd1 : tm_handler  $\in TCTM\_POOL\_ADDRESSES$ 
    grd2 : tm  $\in TM\_SET$ 
    grd3 : tm_handler  $\notin \text{dom}(TCpool)$ 
    grd4 : tm_handler  $\notin \text{dom}(TMpool)$ 
    grd5 : csw_hk_on = TRUE
    grd6 : Type_of_TM(tm) = HK_data_TM
  THEN
    act1 : TMpool(tm_handler) := tm
  END

```

EVENT Store_SCI_Data**REFINES** Store_Data

```

  ANY
    tm_handler
    tm
  WHERE
    grd1 : tm_handler  $\in TCTM\_POOL\_ADDRESSES$ 
    grd2 : tm  $\in TM\_SET$ 
    grd3 : tm_handler  $\notin \text{dom}(TCpool)$ 
    grd4 : tm_handler  $\notin \text{dom}(TMpool)$ 
    grd5 : csw_sci_on = TRUE
    grd6 : Type_of_TM(tm) = SCI_data_TM
  THEN
    act1 : TMpool(tm_handler) := tm
  END

```

EVENT Pass_TM**REFINES** Pass_TM

```

  ANY
    tm_handler
    tm_pointer
  WHERE
    grd1 : tm_handler  $\in \text{dom}(TMpool)$ 
    grd2 : tm_pointer  $\in TM\_BUFFER\_ADDRESSES$ 
    grd3 : tm_pointer  $\notin \text{dom}(TMbuffer)$ 
  THEN
    act2 : TMbuffer(tm_pointer) := TMpool(tm_handler)
    act1 : TMpool := {tm_handler}  $\triangleleft TMpool$ 
  END

```

EVENT Drop_HK_TM**REFINES** Drop_TM

ANY*tm_handler***WHERE***grd1* : *tm_handler* $\in \text{dom}(TMpool)$ *grd2* : *csw_hk_on* = *FALSE**grd3* : *Type_of_TM*(*TMpool*(*tm_handler*)) = *HK_data_TM***THEN***act1* : *TMpool* := {*tm_handler*} $\triangleleft TMpool$ **END****EVENT Drop_SCI_TM****REFINES** Drop_TM**ANY***tm_handler***WHERE***grd1* : *tm_handler* $\in \text{dom}(TMpool)$ *grd2* : *csw_sci_on* = *FALSE**grd3* : *Type_of_TM*(*TMpool*(*tm_handler*)) = *SCI_data_TM***THEN***act1* : *TMpool* := {*tm_handler*} $\triangleleft TMpool$ **END****EVENT env_Deliver_TM****REFINES** env_Deliver_TM**ANY***tm_pointer***WHERE***grd1* : *tm_pointer* $\in \text{dom}(TMbuffer)$ **THEN***act1* : *TMbuffer* := {*tm_pointer*} $\triangleleft TMbuffer$ **END****END**