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An Event-B Specification of Core\_SW @ Date: 24 Oct 2008 @ Time: 03:47:56 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**

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    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**

**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*

$grd5 : tm\_handler \notin dom(TCpool)$   
 $grd6 : tm\_handler \notin dom(TMpool)$   
 $grd7 : Type\_of\_TM(tm) = Exec\_fail\_TM$   
**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**  
 $grd1 : tm\_handler \in TCTM\_POOL\_ADDRESSES$   
 $grd2 : tm \in TM\_SET$   
 $grd3 : tm\_handler \notin dom(TCpool)$   
 $grd4 : tm\_handler \notin dom(TMpool)$   
 $grd5 : csw\_hk\_on = TRUE$   
 $grd6 : Type\_of\_TM(tm) = HK\_data\_TM$   
**THEN**  
 $act1 : TMpool(tm\_handler) := tm$   
**END**

**EVENT Store\_SCI\_Data****REFINES** Store\_Data

**ANY**  
 $tm\_handler$   
 $tm$   
**WHERE**  
 $grd1 : tm\_handler \in TCTM\_POOL\_ADDRESSES$   
 $grd2 : tm \in TM\_SET$   
 $grd3 : tm\_handler \notin dom(TCpool)$   
 $grd4 : tm\_handler \notin dom(TMpool)$   
 $grd5 : csw\_sci\_on = TRUE$   
 $grd6 : Type\_of\_TM(tm) = SCI\_data\_TM$   
**THEN**  
 $act1 : TMpool(tm\_handler) := tm$   
**END**

**EVENT Pass\_TM****REFINES** Pass\_TM

**ANY**  
 $tm\_handler$   
 $tm\_pointer$   
**WHERE**  
 $grd1 : tm\_handler \in dom(TMpool)$   
 $grd2 : tm\_pointer \in TM\_BUFFER\_ADDRESSES$   
 $grd3 : tm\_pointer \notin dom(TMbuffer)$   
**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**