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An Event-B Specification of ABS_DISPLAY2 @ Date: 14 Nov 2007 **@ Time:** 04:43:55 PM
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MACHINE ABS_DISPLAY2

REFINES ABS_DISPLAY1

SEES CDIS_CONTEXT2

VARIABLES

database
page_selections
pages
previous_pages
private_pages
trq
time_now /* Introduction of abstract Date- time constructs into the model. */

INVARIANTS

inv9 : *time_now* \in *Date_time*

EVENTS

INITIALISATION

BEGIN

act3 : *page_selections* := \emptyset
act8 : *database* : \in *Attr_id* \rightarrow *Attrs*
act9 : *previous_pages* := \emptyset
act10 : *private_pages* := \emptyset
act1 : *pages* := \emptyset
act11 : *trq* := \emptyset
act12 : *time_now* : \in *Date_time*

END

EVENT UPDATE_DATABASE

REFINES UPDATE_DATABASE

ANY

ups

WHERE

grd1 : *ups* \in *Attr_id* \leftrightarrow *Attrs*
grd2 : (*ups*; *last_update*) = *dom(ups)* \times {*time_now*} /* New guard which reflects the effect
of date- time introduced into the model in this stage. */

THEN

act1 : *database* := *database* \Leftarrow *ups*

END

EVENT SET_DATA_VALUE

REFINES SET_DATA_VALUE

ANY

ei
ai
av
a

WHERE $grd1 : ei \in EDD_id$ $grd2 : ai \in Attr_id$ $grd3 : av \in Attr_value$ $grd4 : ei \in EDITORS$ $grd5 : a \in Attrs$ $grd6 : value(a) = av$

$grd7 : last_update(a) = time_now$ /* New guard which reflects the effect of date- time introduced into the model in this stage. */

THEN $act1 : database(ai) := a$ **END****EVENT DISPLAY_PAGE****REFINES** DISPLAY_PAGE**ANY** ei no **WHERE** $grd1 : ei \in EDD_id$ $grd2 : no \in Page_number$ $grd3 : no \in dom(pages)$ **THEN** $act1 : page_selections(ei) := no$ **END****EVENT DISMISS_PAGE****REFINES** DISMISS_PAGE**ANY** ei **WHERE** $grd1 : ei \in EDD_id$ $grd2 : ei \in dom(page_selections)$ **THEN** $act1 : page_selections := \{ei\} \triangleleft page_selections$ **END****EVENT ADD_PAGE****REFINES** ADD_PAGE**ANY** ei no pc p **WHERE** $grd1 : ei \in EDD_id$ $grd2 : no \in Page_number$ $grd3 : pc \in Page_contents$ $grd4 : ei \in EDITORS$ $grd5 : p \in Page$ $grd6 : contents(p) = pc$

$grd7 : creation_date(p) = time_now$ /* New guard which reflects the effect of date- time introduced into the model in this stage. */

THEN $act1 : private_pages(no) := p$ **END**

EVENT RELEASE_PAGE**REFINES** RELEASE_PAGE**ANY***no***WHERE***grd1* : *no* \in *Page_number**grd2* : *no* \in *dom(private_pages)**grd3* : *no* \in *dom(pages)***THEN***act1* : *pages*(*no*) := *private_pages*(*no*)*act3* : *previous_pages*(*no*) := *pages*(*no*)*act2* : *private_pages* := {*no*} \triangleleft *private_pages***END****EVENT RELEASE_PAGE_CURRENT****REFINES** RELEASE_PAGE_CURRENT**ANY***no***WHERE***grd1* : *no* \in *Page_number**grd2* : *no* \in *dom(private_pages)**grd3* : *no* \notin *dom(pages)***THEN***act1* : *pages*(*no*) := *private_pages*(*no*)*act2* : *private_pages* := {*no*} \triangleleft *private_pages***END****EVENT RELEASE_PAGES_FROM_TRQ****REFINES** RELEASE_PAGES_FROM_TRQ**ANY***ss**pp**pn***WHERE***grd1* : *ss* \in *Page_number* \leftrightarrow *Page**grd4* : *pp* = {*rp* | *rp* \in *Rel_Page* \wedge (*release_date*(*rp*) \mapsto *time_now*) \in *leq*} /* New guard

which reflects the effect of date- time introduced into the model in this stage. */

grd2 : *ss* = *trq* \triangleright *pp**grd3* : *pn* = *dom(ss)***THEN***act1* : *pages* := *pages* \triangleleft *ss**act3* : *previous_pages* := *previous_pages* \triangleleft (*pn* \triangleleft *pages*)*act2* : *trq* := *trq* \setminus *ss***END****EVENT DELETE_PAGE****REFINES** DELETE_PAGE**ANY***ei**no***WHERE***grd1* : *ei* \in *EDD_id**grd2* : *no* \in *Page_number**grd3* : *ei* \in *EDITORS***THEN***act1* : *pages* := {*no*} \triangleleft *pages**act5* : *previous_pages* := {*no*} \triangleleft *previous_pages*

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    act2 : private_pages := {no}  $\Leftarrow$  private_pages
    act3 : trq := {no}  $\Leftarrow$  trq
    act4 : page_selections := page_selections  $\triangleright$  {no}
  END

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EVENT ADD_PAGE_TO_TRQ**REFINES** ADD_PAGE_TO_TRQ**ANY**

```

    ei
    no
    pc
    p

```

WHERE

```

    grd1 : ei  $\in$  EDD_id
    grd2 : no  $\in$  Page_number
    grd3 : pc  $\in$  Page_contents
    grd4 : ei  $\in$  EDITORS
    grd5 : p  $\in$  Rel_Page
    grd6 : contents(p) = pc
    grd7 : creation_date(p) = time_now    /* New guard which reflects the effect of date- time
introduced into the model in this stage. */
    grd8 : (time_now  $\mapsto$  release_date(p))  $\in$  leq    /* New guard which reflects the effect of date-
time introduced into the model in this stage. */

```

THEN

```

    act1 : trq(no) := p

```

END**EVENT CLOCK**

/* New event introduced in this stage in conjunction with the abstract notion of Date- time. */

ANY

```

    time_next

```

WHERE

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    grd1 : time_next  $\in$  Date_time
    grd2 : time_now  $\mapsto$  time_next  $\in$  leq
    grd3 : time_next  $\neq$  time_now

```

THEN

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    act1 : time_now := time_next

```

END**EVENT VIEW_PAGE****REFINES** VIEW_PAGE**ANY**

```

    ei
    dp
    ed

```

WHERE

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    grd1 : ei  $\in$  dom(page_selections)
    grd2 : dp  $\in$  Disp_params
    grd3 : ed  $\in$  EDD_display
    grd4 : dp_data(dp) = database
    grd5 : dp_page(dp) = pages(page_selections(ei))
    grd7 : dp_time(dp) = time_now    /* New guard which reflects the effect of date- time intro-
duced into the model in this stage. */
    grd6 : ed = disp_values(dp)

```

THEN

```

    skip

```

END

END