An Event-B Specification of

Elevator

A machine for testing the basics of code generation. It can move an elevator up and down between limits specified by constants.

CONTEXT HouseContext 1

SETS 1.1

DIR The direction of travel

CONSTANTS 1.2

up Moving up
down Moving down
max_floor The house has no more than these number of floors.

AXIOMS

axm_01: partition(DIR, {up}, {down})
axm_02: max_floor ∈ ℕ The maximum floor is a number.
axm_03: max_floor = 10

END

MACHINE Elevator 15 a 2

SEES HouseContext

VARIABLES 2.1

curr	Current floor
dest	Destination floor, stop when curr == dest
dir	Direction of movement

INVARIANTS

inv_1:	$curr \in \mathbb{N}$
inv_2:	$curr > 0$
inv_3:	$curr \leq \text{max\_floor}$
inv_4:	$dest \in \mathbb{N}$
inv_5:	$dest > 0$
inv_6:	$dest \leq \text{max\_floor}$
inv_7:	$dir \in \text{DIR}$

EVENT INITIALISATION

THEN

init_1:	$curr := 1$
init_2:	$dest := 1$
init_3:	$dir := \text{up}$

END

EVENT moveUp 2.2

WHERE

grd_1:	$dir = \text{up}$
grd_2:	$curr < \text{max\_floor}$
grd_3:	$curr \neq dest$

THEN

act_01:	$curr := curr + 1$

END

EVENT moveDown 2.3

WHERE

grd_1:	$dir = \text{down}$
grd_2:	$curr > 1$
grd_3:	$curr \neq dest$

THEN

act_01:	$curr := curr - 1$

END

EVENT enterDest 2.4

ANY

d

WHERE

grd_1:	$d \in \mathbb{N}$
grd_2:	$d > 0$

grd_3: $d \leq \text{max\_floor}$

THEN

act_1: $dest := d$

END

EVENT startMovingUp 2.5

WHERE

grd_1: $dest > curr$

gtd_2: $dir = \text{down}$

THEN

act_1: $dir := \text{up}$

END

EVENT startMovingDown 2.6

WHERE

grd_1: $dest < curr$

gtd_2: $dir = \text{up}$

THEN

act_1: $dir := \text{down}$

END