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