

---

MODULE *SimpleBuilding*

---

A simple system to maintain a register of users authorised to enter a building and to keep track of whether each registered user is in the building or not.

CONSTANT

*PERSON*

set of persons

VARIABLE

*register*,

set of registered users

*in*,

set of users inside the building

*out*

set of users outside the building

*TypeOk*  $\triangleq$

$\wedge \text{register} \subseteq \text{PERSON}$

Everyone on the register is a person

$\wedge \text{register} = \text{in} \cup \text{out}$

The location of every registered person is known

$\wedge \text{in} \cap \text{out} = \{\}$

Nobody can at the same time be both inside and outside the building

---

*Init*  $\triangleq$

$\wedge \text{register} = \{\}$

Initially, nobody is registered

$\wedge \text{in} = \{\}$

$\wedge \text{out} = \{\}$

*Register*(*p*)  $\triangleq$

$\wedge p \in \text{PERSON} \setminus \text{register}$

Can only register an unregistered person

$\wedge \text{register}' = \text{register} \cup \{p\}$

The person is added to the register

$\wedge \text{out}' = \text{out} \cup \{p\}$

When first registered, the person is outside the building

$\wedge \text{in}' = \text{in}$

Registering a person does not change who is inside the building

*Enter*(*p*)  $\triangleq$

$\wedge p \in \text{out}$

Only registered persons outside the building can enter

$\wedge \text{in}' = \text{in} \cup \{p\}$

The person is added to the set of persons inside the building

$\wedge \text{out}' = \text{out} \setminus \{p\}$

The person is removed from the set of persons outside the building

$\wedge \text{register}' = \text{register}$

The register is unchanged

*Leave*(*p*)  $\triangleq$

$\wedge p \in \text{in}$

Only registered persons inside the building can leave

$\wedge \text{out}' = \text{out} \cup \{p\}$

The person is added to the set of persons outside the building

$\wedge \text{in}' = \text{in} \setminus \{p\}$

The person is removed from the set of persons inside the building

$\wedge \text{register}' = \text{register}$

The register is unchanged

*Next*  $\triangleq$

$\exists p \in \text{PERSON} :$

A *Next* step is ...

$\vee \text{Register}(p)$

for some person ...

$\vee \text{Enter}(p)$

either the person is registered

$\vee \text{Leave}(p)$

or the person enters the building

or the person leaves the building

---

\ \* Modification History

\\* Last modified Sun *Sep* 23 10:56:47 *BST* 2018 by *cgdk2*  
\\* Created *Wed Sep* 12 12:44:40 *BST* 2018 by *cgdk2*