

MODULE <i>SimpleBuilding</i>	
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	
<i>PERSON</i>	set of persons
VARIABLE	
<i>register</i> ,	set of registered users
<i>in</i> ,	set of users inside the building
<i>out</i>	set of users outside the building
<i>TypeInvariant</i> $\triangleq$	
$\wedge register \subseteq PERSON$	Everyone on the register is a person
$\wedge register = in \cup out$	The location of every registered person is known
$\wedge in \cap out = \{\}$	Nobody can at the same time be both inside and outside the building
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<i>Init</i> $\triangleq$	
$\wedge register = \{\}$	Initially, nobody is registered
$\wedge in = \{\}$	
$\wedge out = \{\}$	
<i>Register(p)</i> $\triangleq$	
$\wedge p \in PERSON \setminus register$	Can only register an unregistered person
$\wedge register' = register \cup \{p\}$	The person is added to the register
$\wedge out' = out \cup \{p\}$	When first registered, the person is outside the building
$\wedge in' = in$	Registering a person does not change who is inside the building
<i>Enter(p)</i> $\triangleq$	
$\wedge p \in out$	Only registered persons outside the building can enter
$\wedge in' = in \cup \{p\}$	The person is added to the set of persons inside the building
$\wedge out' = out \setminus \{p\}$	The person is removed from the set of persons outside the building
$\wedge register' = register$	The register is unchanged
<i>Leave(p)</i> $\triangleq$	
$\wedge p \in in$	Only registered persons inside the building can leave
$\wedge out' = out \cup \{p\}$	The person is added to the set of persons outside the building
$\wedge in' = in \setminus \{p\}$	The person is removed from the set of persons inside the building
$\wedge register' = register$	The register is unchanged
<i>Next</i> $\triangleq$	
$\exists p \in PERSON :$	A <i>Next</i> step is ...
$\vee Register(p)$	for some person ...
$\vee Enter(p)$	either the person is registered
$\vee Leave(p)$	or the person enters the building
	or the person leaves the building
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\ * Modification History	

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