Solution Sheet 1: Requirements Document

1 Description of Work

The aim of this exercise is to write a requirements document.

2 An Access Control System

Here is the informal description of an access control system. This description is quite poorly written (on purpose). The system consists of the following parts:

- A set of rooms.
- Rooms are connected by doors.
- Among the rooms, a special room called the "hallway".
- The hallway is the only room connected to "outside".

The access control system should enforce that only authorized persons can enter a room. For this, each person is equipped with a magnetic card and each door is equipped with a device able to read cards.

3 Your Task

Your task consists in re-writing the previous (very poor) description given in section 2. In case you think that some details are missing in the previous description, you are free to add more.

As explained in the lecture, your new requirement document should consist in two embedded texts: the *reference* text and the *explanatory* text.

The reference text consists in a series of short labelled and numbered statements. You should propose some labels. A reference statement is either an *assumption* concerning the environment of the system or an explicit *property* that the system must fulfilled in order to be said to be *correct*. The reference text will form the final contract between the "client" and the "designers" of the future system.

The explanatory text is a free text situated in between the reference statements. It contains some additional information for someone encountering this problem for the first time.

4 A Solution

We shall construct a system which will be able to control the access of certain people to different rooms of a building.

The system concerns people and rooms	FUN-1

The control takes place on the basis of the authorization that each concerned person is supposed to possess. This authorization should allow him, controlled by the system, to penetrate into certain rooms, and not into others. For example, a certain person p_1 is authorized to enter room l_1 and not room l_2; however, another person p_2 is allowed to enter both rooms. These authorizations are given on a "permanent" basis: in other words, they will not change during a normal functioning of the system.

People are permanently assigned the authorization to access certain rooms	FUN-2

A person which is in a room must be authorized to be there	FUN-3

When someone is inside a room, his eventual exit must also be controlled by the system, so as to be able to know at any moment who is inside a given room. Each involved person receives a magnetic card with a unique identifying sign, which is engraved on the card itself.

Each person receives a personal magnetic card	EQP-1

Card readers are installed at each entrance and at each exit of concerned rooms. Near to each reader, two control lights can be found: a red one and a green one. Each one of these lights can be on or off.

Each entrance and exit of a room is equipped with a card reader	EQP-2

Each card reader has two lights: one green light and one red light	EQP-3

Each light can be "on" or "off".	EQP-4

The transfer of people from one room to another takes place thanks to "turnstiles" which are normally blocked: nobody can get through them without being controlled by the system, any person getting through is detected by a sensor.

Rooms communicate via one-way turstiles	EQP-5

Each turnstile is only affected to a single task, either entry or exit, there are no "two-way" turnstiles. Turnstiles and card readers are illustrated on figure 1.
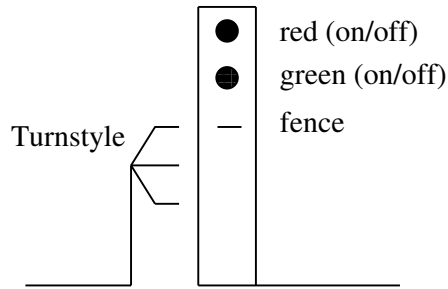
Fig. 1. Turnstile ansd Card Reader

A sensor detects the passage of a person through a turnstile	EQP-6

Introducing now the hallway and "outside"

A special "room" is called "outside". Everybody can be outside	EQP-7

Another special room is called "hallway". It is the only room connected to "outside"	EQP-8

Turnstiles are normally blocked	FUN-4

The entry or the exit of a room follows a systematic procedure composed of a suite of events. A person wishing to enter or exit a room puts his card into the card reader on the appropriate turnstile. One is then faced with the following alternatives:

- If the person is authorized to pass through the turnstile, the green control light is lit and the turnstile is opened during 30 seconds. We are now faced with the following situation:
  - As soon as the individual gets through the turnstile within the 30 seconds limit, the green control light goes out immediately and the turnstile blocks.

  - If, however, 30 seconds go by without anybody going through the turnstile, the control light goes out and the turnstile is also blocked.

- If the person is not authorized to pass through the turnstile, the red control light goes on for two seconds and, of course, the turnstile remains blocked.

A person willing to pass through a turnsile puts its card in the fence of the card reader	FUN-5

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If the person is accepted, the green light is lit and the turnstile is unblocked for at most 30 seconds.	FUN-6

If the person is not accepted, the red light is lit for 2 seconds and the turnstile remains blocked	FUN-7

As soon as an accepted person has gone through an unblocked turnstile, the green light is turned off and the turnstile is blocked again	FUN-8

If nobody goes through an unblocked turnstile during the 30 seconds period, the green light is turned off and the turnstile is blocked again	FUN-9

Next are two safety requirements. The first one is very general, the second one indicates a "solution".

No persons must remain blocked in a room	SAF-1

Any person authorized to be in a room which is not "outside", must also be authorized to be in another room communicating with the former and leading towards outside.	SAF-2