Elevator

A company UpAndDown (UAD) delivers elevators with embedded systems.

In a new building, it is unknown yet how many elevators need to placed, therefore there is a simulation needed to determine whether 1, 2 or 3 elevators should be used.

The building has n floors (1..n) and on each floor there are m apartments (1 person per apartment).

Requirements:

>The simulation is an embedded solution, should be written in C and using the technologies learned in UNPL (sockets, semaphores, threads, mutexes, mailboxes).

Functionality:

>Each floor (2..n) is implemented as a separate process, running on some computer in the network. Each floor spawns (simulation arriving) people, going to some other floor (mostly to the ground floor being floor nr. 1).

>Each floor also keeps track of the nr of people in the apartments, so never more than m persons can leave a floor at the same time.

>Floor 1 is implemented as a separate process, spawning people, going to another floor (2..n).

>Distance between floors is 4.5m.

>Elevator (as a separate thread) moves between floors with a speed of 3 m/s, starting (acceleration) takes 2 seconds, and stopping (deceleration) takes also 2 seconds.

>Elevator can contain max. 5 people.

>People entering and leaving the elevator takes 3 seconds per person.

>Most people leave and arrive at the building during rush hour (6am-9am, 11am-1pm and 4pm-7pm)

Control:

>Control, implemented as a process, with multiple threads, receives requests (people waiting at floor i, moving to floor j) and communicates to elevator to move from floor i to j.

>If, in the meantime, an other request is received which is in between the current movement, the elevator stops and picks up the people.

Important aspect for the control-unit is the logging of important data, like:

- Average waiting time for people
- Average travel time for people
- Average idle time for elevator
- …

This is needed to determine whether 1, 2 or 3 elevators need to be placed in the building.

More functionality to be discussed with the coaches.