Homework Assignment 2

To: CSci 5802, All students
CC: Teaching Assistant
From: Dr. Mats Heimdahl
Date: 2/26/00
Re: Homework Assignment 4

Overview
An elevator system is to be installed in a building with $m$ floors. The problem concerns the logic required to move the elevators.

Purpose of model
Clarify the functionality of the elevator and its buttons. In addition, we want to settle on a scheduling algorithm and evaluate if it satisfies our criteria.

Elevator description
Note that this is an informal description of the elevator and you may need to make some changes to make your formal model work out right. For each change, make sure you explain why the change is needed and justify why the decisions you made satisfies the spirit (if not the letter) of the informal requirements.

Informal requirements
1. The elevator has a set of buttons inside, one button for each floor. These illuminate when pressed and cause the elevator to visit the corresponding floor.

2. The elevator button illumination is canceled when the corresponding floor is visited (i.e., stopped at) by the elevator.

3. Each floor has two buttons (except ground and top), one to request an up-elevator and one to request a down-elevator. These buttons illuminate when pressed.

4. The floor buttons are canceled when the elevator visits the floor and is either traveling the desired direction, or visiting a floor with no requests outstanding. In the latter case, if both floor request buttons are illuminated, only one should be canceled.

5. When the elevator has no requests to service, it should remain at its final destination and await further requests.

6. All requests for the elevator from floors must be serviced eventually, with all floors given equal priority.
7. All requests for floors within the elevator must be serviced eventually, with floors being serviced sequentially in the direction of travel.

Your task
You are to provide a VDM-SL model of the elevator system. The model shall implement (to the greatest extent possible) the requirements above.

I expect the following documents to be handed in.

1. The completed VDM-SL model, liberally commented.

2. A trace of the testing you have performed on the model. I expect you to test each function and show that it works. In addition, I want you to show that the system as a whole works properly.

3. A report (short) discussing (i) how your model satisfies each informal requirement, (ii) how your test cases demonstrate that the model works, and (iii) an informal correctness argument for your scheduling algorithm (as modeled in VDM-SL) – argue why this algorithm will fairly serve each floor.

Due Date
Thursday, March 9 in class