

SE 420 Formal Methods for Specification & Design - Fall 2008 - Schedule

Project 2

Purpose: practice using Z

Keep track of the amount of time you take completing this assignment.

You may work in teams of 1 or 2 on this project.

This is a continuation of P1. Your company, Higher Expectations Ltd., makes lifts (elevators). Your job is to specify a system for an installation that includes 2 lifts for 3 floors. Here is an informal description of the expected behavior:

1. Each lift has a set of buttons, one for each floor. These illuminate when pressed and cause the lift to visit the corresponding floor. The illumination is canceled when the corresponding floor is visited by the lift.
2. Each floor has 2 buttons (except the ground and top floors, which have only one), one to request an up-lift and one to request a down-lift. These buttons illuminate when pressed. The illumination is canceled when a lift visits the floor and is either moving in the desired direction or has no outstanding requests. In the latter case, if both floor request buttons are pressed only one should be canceled. The algorithm to decide which to service first should minimize the waiting time for both requests.
3. Each lift has two arrows indicating future direction. One arrow is illuminated as the doors open. The illumination is canceled as the doors close.
4. When a lift has no requests to service, it should remain at its final destination with its doors open and await further requests.
5. All requests for lifts from floors must be serviced eventually, with all floors given equal priority.
6. All requests for floors within lifts must be serviced eventually, with floors being serviced sequentially in the direction of travel.

Add a specification of the states of passengers and intended passengers (people waiting for a lift), including their intended destinations.

Add a specification of the controller for the lifts. Include the following example sequences of events:

- one person on floor 3 requesting a lift to descend to floor 1
- a person on floor 1 and a person on floor 2 each requesting a lift to ascend to floor 3
- two people on floor 2, one requesting a lift to ascend to floor 3 and the other requesting a lift to descend to floor 1

For each example sequence show that the composition of the requests and the action of the controller results in satisfaction of all the requests. That is, describe the expansion of the composition and show the simplified result.

Use `ztc` to type-check your specification.

Submit your specification to the dropbox. Include a note about the amount of time spent by each member of the team.