Homework 7: Message Passing

Due: Tuesday, December 5, 2006.

In this homework you will learn basic techniques of programming in the message passing model.

For all programing tasks, you must run your code using the Mozart/Oz system. For these you must also provide evidence that your program is correct (for example, test cases). For testing, you may want to use tests based on my code in the course library file `Test.oz`, as shown in homework 4.

Hand in a printout of your code and the output of your testing, for all questions that require code.

Be sure to clearly label what problem each area of code solves with a comment.

Don't hesitate to contact the staff if you are stuck at some point.

Read Chapter 5 of the textbook [RH04].

Message Passing

1. (60 points) [Fault tolerance for the lift control system] Do any one part of the parts (a)–(e) of problem 3 in section 5.9 of the textbook [RH04]. You can get the code for the book's figures from the book's supplementary web site: `http://www.info.ucl.ac.be/~pvr/ds/mitbook.html`.

   Note that in part (a) "when the floor is called" refers to `call` messages sent to a `Floor` port object. In part (b), you can design a wrapper port object that takes a `disable` message and then sends the `down` messages suggested; this wrapper can take port for the "linked" component as an argument, and send it the `down` message when the wrapper instance gets the `disable` message. That will allow testing.

2. (40 points) [Erlang's receive as a control abstraction] Do problem 7 in section 5.9 of the textbook [RH04]. Note that, according to the book's errata, when the `D` argument to `Mailbox.receive` has the form `T#E`, then `E` should be a *zero*-argument function.

Exam Review Problems

3. (10 points) Write and solve a short, conceptual (not programming) potential exam question relating to chapters 3–5 of the textbook or our class discussions about them.

4. (30 points) Write and solve a potential exam problem relating to chapters 3–5 of the textbook or our class discussions about it. Include a brief justification of why you think this would make a good problem for an exam.

Extra Credit Problems

5. (25 points, each; extra credit) Do problem 2, 4, 5, or 8, or additional parts of problem 3 from section 5.9 of the textbook [RH04].

References

[RH04] Peter Van Roy and Seif Haridi. *Concepts, Techniques, and Models of Computer Programming*. The MIT Press, Cambridge, Mass., 2004.