FMSE Homework Exercises 2010–2011, Series 2

- The exercises are to be done in pairs.
- Your solution should consist of a zip file containing the source files of the FSP specifications, together with a typed report *in PDF format* containing the listings as well as your answers to the questions.
- List the authors of the solution, with name and student number, *both* in the submission email *and* in your typed report.
- Submit your solution by emailing it to your exercise group supervisor. (For this purpose you have to be enrolled in one of the exercise groups on Blackboard.)
- Deadline for submission: Friday 8 April 2011.

Exercise 1

A bank has a number of service desks. Each desk can be open, in which case it can help a customer with a transaction, or closed. A desk can only service one customer at a time. There are actions `open` and `close` to transit from one state to the other. A transaction has a distinguished `start` and `end`; the desk cannot `close` in the middle of a transaction.

Before being serviced, a customer has to `queue`. After queueing, a customer can be serviced by any of the available desks. The order of service does not need to be the same as the order in which the `queue` actions occurred.

a. Specify the behaviour of this bank in FSP, for a fixed number of desks and customers (numbered from 1 to the maximum). Your solution should not have safety or progress issues.

b. If all customers except number 1 are very assertive, so that their `start` actions are always handled in preference to anything else, is progress always guaranteed for customer 1, irregardless of the number of desks and customers? Analyse this in LTSA and explain the result.

c. Answer the same question if not just the `start` actions but also the `queue` actions of all customers except number 1 have precedence.

Exercise 2

Specify a safety property that states that, once a desk has started servicing a customer, it will end the transaction with that customer before starting or ending another transaction. Check that your solution for Exercise 1 satisfies this satefy property.

Exercise 3

Another bank is organised slightly differently: here every desk has its own queue. A desk may close while there are customers in the queue; in that event, the customers have to queue again (for a different desk, or even the same if it reopens). Customers can only queue for open desks.

Answer the same questions as in Exercise 1, for this bank. Explain the differences with the first bank.