Formal Model and Verification

Exercise 6: Communicating finite state machines

** In the following, we assume finite-state models are non-halting and do not have a final state. Please draw the finite-state models with our model editor in REDLIB Sourceforge webpage.

1. Use RED to construct a communicating finite-state model in GCM style for the interaction between a customer and the following vending machine M that accepts nickels, dimes, and quarters. M accepts changes until 35 cents have been put in. It gives change back for any amount greater than 35 cents. Then the customer can push buttons to receive a cola, a root beer, or a ginger ale. The customer and the vending machine communicate through input (?) and output (!) synchronizers in GCM style.

2. Construct a DVD-management system that may interact with two types of users: the customer and the administrator. The customer may rent and return a DVD. Renting a DVD costs 1 dollar. The DVD system must also receive bills of 1 dollar from the customer. If the box of bills is full in the DVD-management system, the system sends a signal to the administrator to empty the bills and waits for the actions of the adminstrator. After the administrator has emptied and placed back the bill box, the DVD-management system returns to its normal service to the custormers. Please draw the system model as three communicating finite-state machines: one for the DVD-management system, one for a customer, and one for the administrator.

3. Please modify the reader-writer model in the lecture with the following requirements.

   3.a The read and write operations do not have to happen at the same time.

   3.b The buffer capacity is 3.