Modeling of an elevator

We consider to model an elevator system of a 10-storey building. The elevator system consists of a controller and a cabin. The diagram in Fig.1 shows the two components of the system and the signals exchanged between them and with the environment. The UB(i) and DB(i) are the signals corresponding to the elevator call buttons located at floor i (UB(i) to go up and DB(i) to go down). The CB(i) is the signal corresponding to the elevator control buttons located in the cabin: CB(i) controls movement to floor i. The controller receives signals SF(i) and AF(i) from the cabin. The SF(i) signal indicates that the cabin is stationary on floor i and it is ready to receive commands from the controller; while the AF(i) signal announces that the cabin is approaching floor i. The controller controls the cabin using the up(), down(), and stop() signals.
The corresponding object diagram is shown in the figure below.

Note the attributes of the controller class SCB[0..9], SUB[0..8], and SDB[1..9]. These attributes reflect the “on” or “off” state of the various buttons. For example, if SUB[i] = true then the button up of floor i is on.

By adopting a policy of serving floors without starvation (no request can wait indefinitely) give the state machine modeling for controller’s behavior.

Note: in transitions, we can use a simplified notation for the signals, whether in the triggers (signals received) or in the actions (signals sent). It will be enough simply to give the name of the signal (with its parameters if necessary) without having to provide other details (in fact, in this elevator system, the name of a signal is sufficient to determine its origin and the destination).