Verification Techniques 2010, Homework 1

This assignment consists of 2 problems, and should be handed in at the latest by Thursday, Jan. 28.

Problem 1 In the below figures you find three suggestions for action systems that are intended to implement mutual exclusion between two processes. In all action systems, locations l_1 and m_1 are intended to represent the section of a process which is not interested in the critical section, locations l_2 and m_2 are intended to represent the section where the process is interested in entering the critical section, and locations l_3 and m_3 represent the critical sections themselves. The purpose of a mutual exclusion algorithm is to ensure that

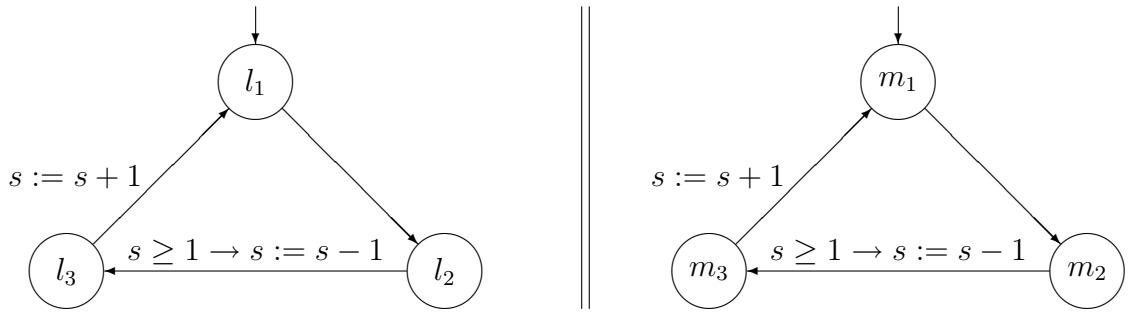
1. At most one process is in its critical section at any time
2. A process that intends to enter its critical section should be allowed to do so eventually, or after some reasonable waiting time

For each of the action systems you should determine how well it satisfies these two criteria. You are also welcome to criticize some of the solutions on other grounds, and possibly improve them (this last part is not required).

Action System *mutex1*

declare s : integer

initially $s = 1$

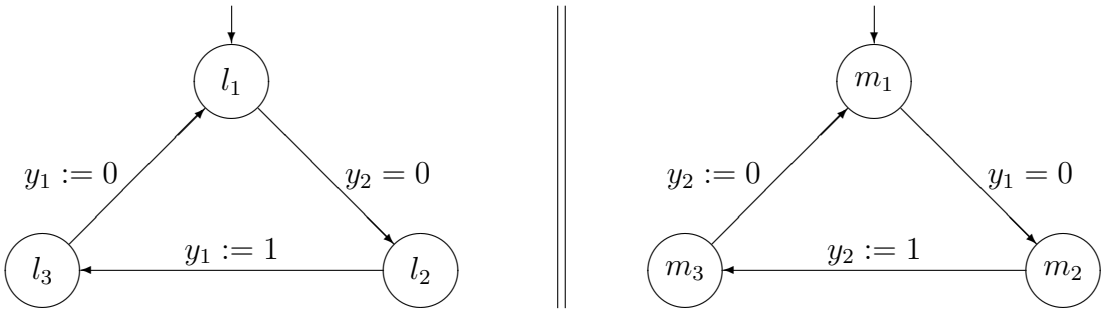


end

Action System *mutex2*

declare y_1, y_2 : integer

initially $y_1 = y_2 = 0$

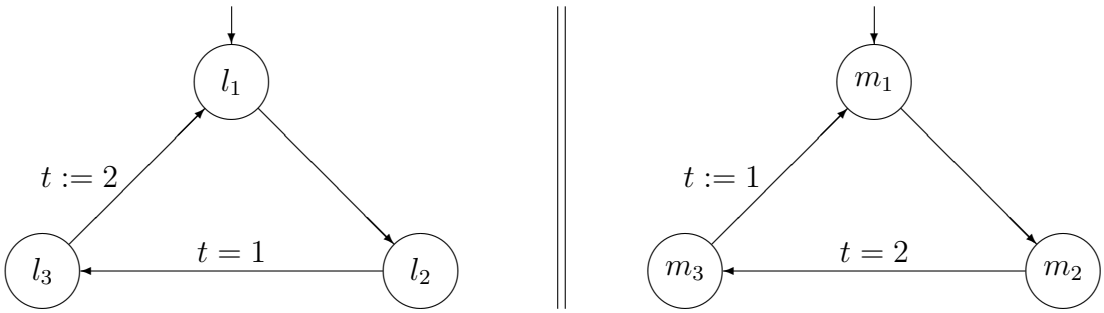


end

Action System *mutex3*

declare t : integer

initially $t = 1$



end

Problem 2. Construct the transition system corresponding to the action system *mutex2* in the previous problem.