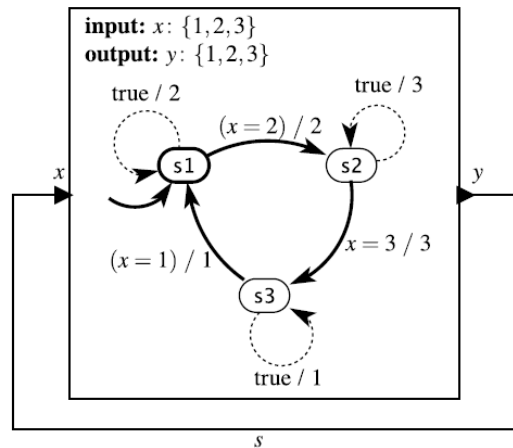


Chapter 6 Concurrent models of computation

2. Consider the following state machine in a synchronous feedback composition:



(a) Is it well-formed? Is it constructive?

Solution: Yes, it is well formed and constructive because in each state, even if the input is unknown, the output can be determined.

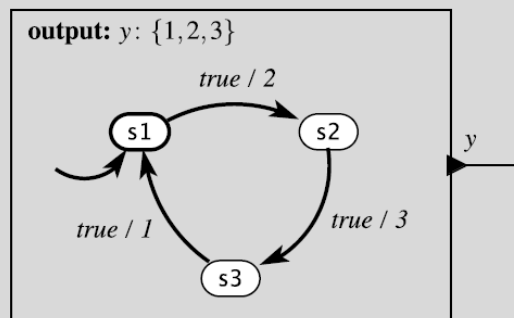
(b) If it is well-formed and constructive, then find the output symbols for the first 10 reactions. If not, explain where the problem is.

Solution: The output sequence for the first 10 reactions is

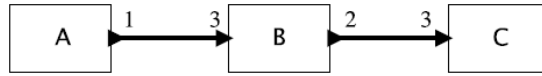
$(2, 3, 1, 2, 3, 1, 2, 3, 1, 2).$

(c) Show the composition machine, assuming that the composition has no input and that the only output is y .

Solution:



8. Consider the following SDF model:



The numbers adjacent to the ports indicate the number of tokens produced or consumed by the actor when it fires. Answer the following questions about this model.

- (a) Let q_A , q_B , and q_C denote the number of firings of actors A, B, and C, respectively. Write down the balance equations and find the least positive integer solution.

Solution:

$$\begin{aligned} q_A &= 3q_B \\ 2q_B &= 3q_C . \end{aligned}$$

The least positive inter solution is

$$\begin{aligned} q_A &= 9 \\ q_B &= 3 \\ q_C &= 2 . \end{aligned}$$

- (b) Find a schedule for an unbounded execution that minimizes the buffer sizes on the two communication channels. What is the resulting size of the buffers?

Solution: The following schedule minimizes buffer sizes:

A, A, A, B, A, A, A, B, C, A, A, A, B, C .

The buffer between A and B has size 3, and the buffer between B and C has size 4.