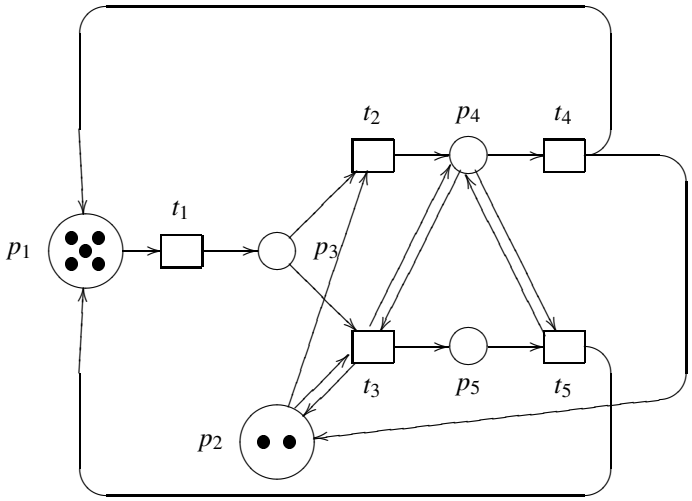
T-79.231 Parallel and distributed digital systems
Tutorial #7
Nov 4th, 2002

1. Consider the following multiprocessor system:



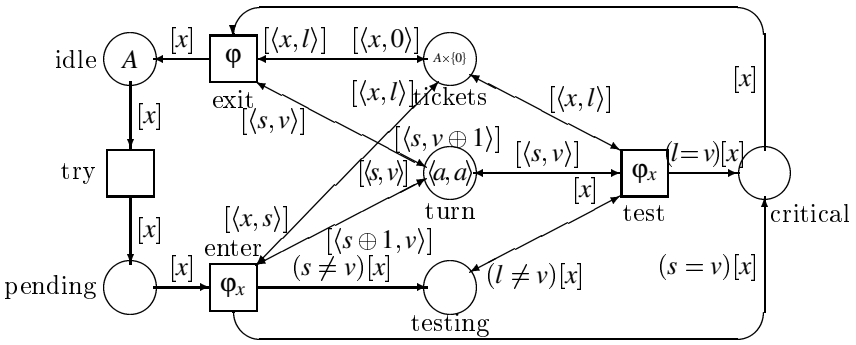
where

- p_2: the free buses.
- p_4: the processor has access to the memory.

(a) Prove with invariants that at most 2 processors can access the memory concurrently (i.e. the place p_4 has at most 2 tokens).

(b) Prove that the following holds in all reachable states of the system: $M(p_1)+M(p_3)+M(p_4)+M(p_5)=5$.

2. Below is shown the high level net of the TicketME algorithm (Lecture 5, p. 22).



(a) Write the net in Maria net description language. Specify the following properties in LTL logics and do the model checking with Maria (using either an LTL formula or a reject statement):

- Two processes are never concurrently in the critical section.
- The process 1 never makes it to the critical section.
- If the process 1 wants to access the critical section, it will eventually make it there.
- If the process 2 is in the critical section, it will eventually leave the critical section.

(b) In the lecture slides there are stated fairness assumptions regarding the model. Define the fairness assumptions in Maria and do the model checking regarding the following property:

- If the process 1 wants to access the critical section, it will eventually make it there.