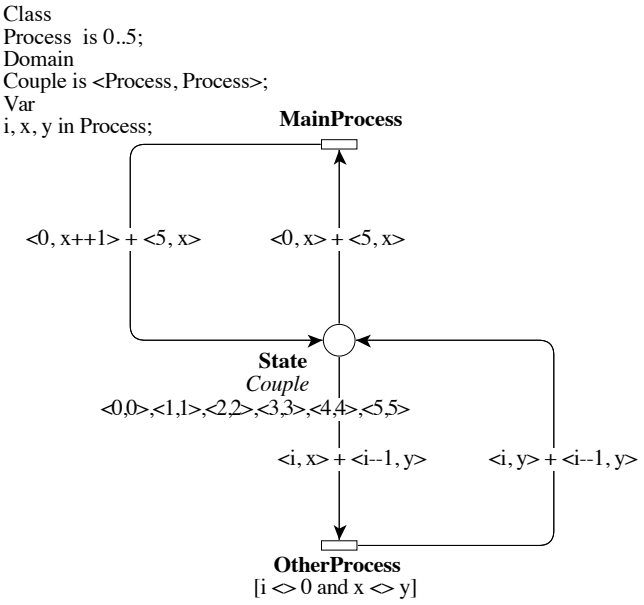
Alexis Marechal
Alexis.Marechal@unige.ch

Introduction

This Model form is a short description of the Token Ring model that comes, for the Model Checking Contest @ Petri Nets, with: a set of PNML files, a set of properties to be checked (possibly one file per model instance) and an optional set of properties concerning the model (invariants, etc. – possibly one file per model instance). For Coloured Nets, equivalent PNML P/T net files are proposed too.

Token Ring



Presentation

Description: We consider a system where a set of machines are places in a ring, numbered 0 to N. Each machine i only knows its own state and the state of its left neighbor, i.e., machine $(i-1)\%(N+1)$. Machine number 0 plays a special role, and it is called "the bottom machine". The state of each machine is an integer number in $[0, N]$. We will note $S(i)$ the state of machine i.

Each machine may determine if it has a so-called "*privilege*" based on its state and the one of its left neighbor. A privilege is in this context the right to perform an operation. After performing its operation, the machine updates its own state, and may loose its privilege.

The objective of the protocol is to reach a stable state for the system. In a stable state:

- there is a unique machine with a privilege,
- any subsequent state is also a stable state.

Furthermore, the protocol ensures non-starvation: at any time, any machine is sure to have a privilege after a finite number of steps.

The detail of the protocol is different for the bottom machine, and the other machines:

- The bottom machine has the privilege if its left neighbor state is equal to its own state. In this case, the bottom machine updates its status by incrementing it: if $S(N) = S(0)$ then $S(0) := (S(0)+1)\%N$
- Any other machine $i > 0$ has the privilege if its left neighbor state is different from its own state. In this case, machine i updates its status by setting it to the value of the left machine: if $S(i-1)! = S(i)$ then $S(i) := S(i-1)$.

Origin: http://www.cs.utexas.edu/ EWD/ewd04xx/EWD426.PDF

Alexis Marechal
Alexis.Marechal@unige.ch

Scaling parameter

Name	Description	Values
N	Number of processes. It has an impact on the initial marking of the place *State*, as well as most of the colored funcitons.	5, 10, 15, 20, 30, 40, 50

Data on the Model

Number of places	Number of transitions	Number of arcs	Scaling parameter value
1	2	4	5, 10, 20, 50, 100, 200, 500

Information about the Model

Stated Properties

safe	?	**free choice**	✗	**event graph**	✗
deadlock	?	**state machine**	✗	**reversible**	?

Other Properties (not mandatory)