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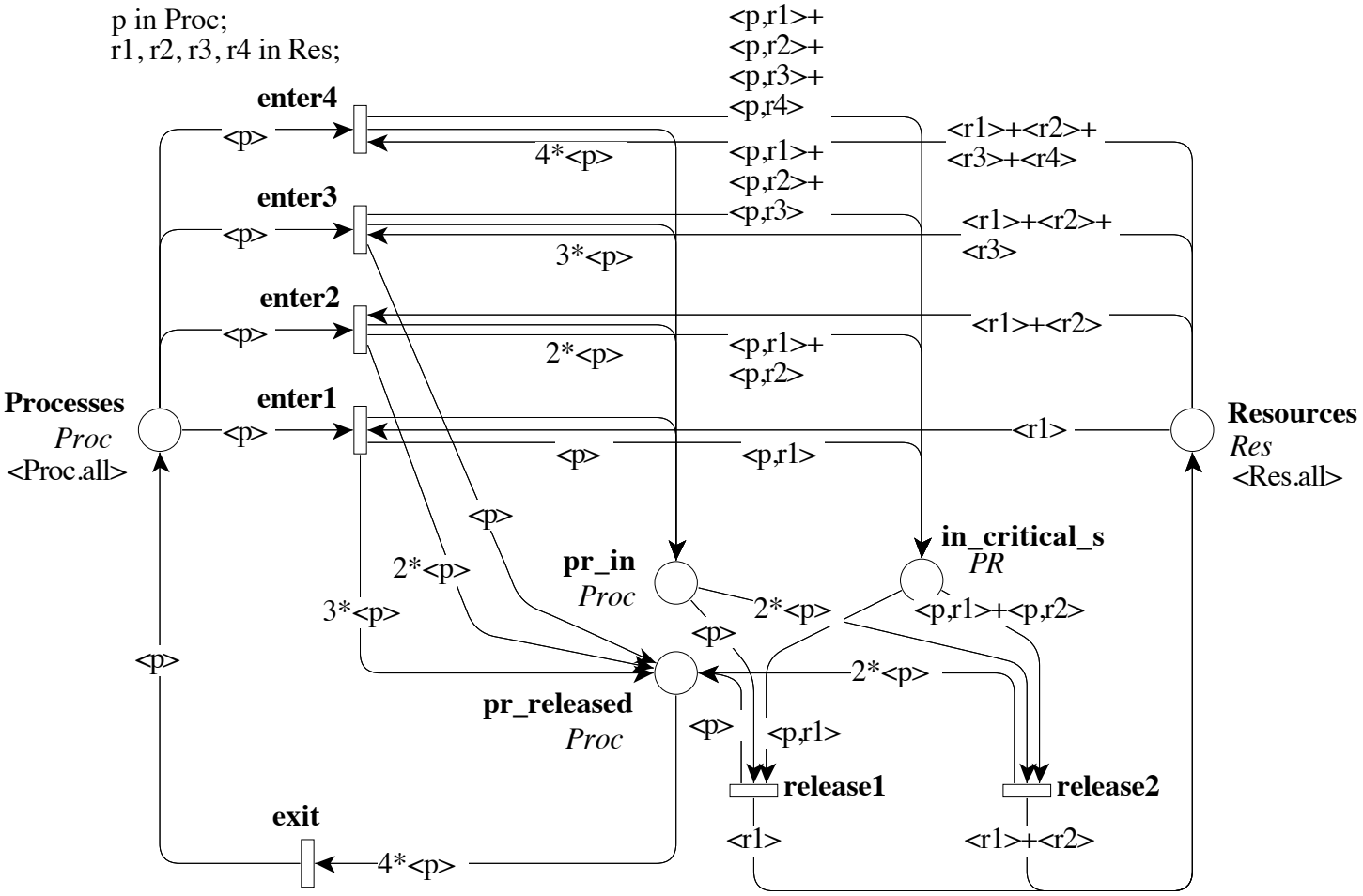
This form is a summary description of the model entitled "Global Allocation Resource Management" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given together with property files (possibly, one per model instance) giving a set of properties to be checked on the model.

Description

Management of resources with the declaration of all resources to be used in a critical section. when process p enters a critical section (transition enter) it locks all the resources needed to be used in the critical section (4 max). Then, it can release a subset of these resources, max 2 at a time (and then stay in the critical section) or exit the critical section, thus releasing all the remaining resources it locks.

Class
  Proc is 1..3;
  Res is 1..6;
Domain
  PR is <Proc,Res>;
Var
  p in Proc;
  r1, r2, r3, r4 in Res;



References

From a book on operating systems by Sacha Krakowiak. The model is presented and explained in the reference below:

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1. M. Colange, L.-M. Hillah, F. Kordon, and P. Parutto. Extreme symmetries in complex distributed systems: The bag-oriented approach. In Large-Scale Complex IT Systems. Development, Operation and Management - 17th Monterey Workshop 2012, volume 7539 of Lecture Notes in Computer Science, pages 330–352. Springer, 2012.

Scaling parameter

Parameter name	Parameter description	Chosen parameter values
(Cardinality of Proc and Res classes)	see description	$(n, 2 \times n)$ with $n \in \{3, 5, 6, 7, 9, 10, 11\}$

Size of the colored net model

number of places: 5
number of transitions: 7
number of arcs: 29

Size of the derived P/T model instances

Parameter	Number of places	Number of transitions	Number of arcs
$n = 3$	33	4791	38652
$n = 5$	75	56105	492760
$n = 6$	102	136662	1226388

Structural properties

ordinary — *all arcs have multiplicity one* ✗
simple free choice — *all transitions sharing a common input place have no other input place* ✗ (a)
extended free choice — *all transitions sharing a common input place have the same input places* ✗ (b)
state machine — *every transition has exactly one input place and exactly one output place* ✗ (c)
marked graph — *every place has exactly one input transition and exactly one output transition* ✗ (d)
connected — *there is an undirected path between every two nodes (places or transitions)* ✓ (e)
strongly connected — *there is a directed path between every two nodes (places or transitions)* ✓ (f)
source place(s) — *one or more places have no input transitions* ✗ (g)
sink place(s) — *one or more places have no output transitions* ✗ (h)
source transition(s) — *one or more transitions have no input places* ✗ (i)
sink transitions(s) — *one or more transitions have no output places* ✗ (j)
loop-free — *no transition has an input place that is also an output place* ✓ (k)
conservative — *for each transition, the number of input arcs equals the number of output arcs* ✗ (l)
subconservative — *for each transition, the number of input arcs equals or exceeds the number of output arcs* ✗ (m)
nested units — *places are structured into hierarchically nested sequential units* (n) ✗

(a) the net is not ordinary in all its 2 instances (3 and 5).
(b) the net is not ordinary in all its 2 instances (3 and 5).
(c) the net is not ordinary it all its 2 instances (3 and 5).
(d) the net is not ordinary in all its 2 instances (3 and 5).
(e) stated by CÆSAR.BDD version 1.7 on all 2 instances (3 and 5).
(f) stated by CÆSAR.BDD version 1.7 on all 2 instances (3 and 5).
(g) stated by CÆSAR.BDD version 1.7 on all 2 instances (3 and 5).
(h) stated by CÆSAR.BDD version 1.7 on all 2 instances (3 and 5).
(i) stated by CÆSAR.BDD version 1.7 on all 2 instances (3 and 5).
(j) stated by CÆSAR.BDD version 1.7 on all 2 instances (3 and 5).
(k) stated by CÆSAR.BDD version 1.7 on all 2 instances (3 and 5).
(l) stated by PNML2NUPN 1.3.0 on all 2 instances (3 and 5).
(m) stated by PNML2NUPN 1.3.0 on all 2 instances (3 and 5).
(n) the definition of Nested-Unit Petri Nets (NUPN) is available from http://mcc.lip6.fr/nupn.php

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Behavioural properties

safe — *in every reachable marking, there is no more than one token on a place* ..... ✗
deadlock — *there exists a reachable marking from which no transition can be fired* ..... ✗ [o]
reversible — *from every reachable marking, there is a transition path going back to the initial marking* ..... ?
quasi-live — *for every transition t, there exists a reachable marking in which t can fire* ..... ✓
live — *for every transition t, from every reachable marking, one can reach a marking in which t can fire* ..... ✓

Size of the marking graphs

Parameter	Number of reachable markings	Number of transition firings	Max. number of tokens per place	Max. number of tokens per marking
$n = 3$	6320 [p]	116 178 [q]	4 [r]	18 [s]
$n = 5$	1.0660E+8 [t]	?	?	≥ 15
$n = 6$	2.5725E+10 [u]	?	?	≥ 18
$n = 7$	8.5698E+12 [v]	?	?	?
$n = 9$	2.1185E+18 [w]	?	?	?

[o] checked by the Crocodile tool in 2012, see reference 1; confirmed at MCC'2014 by GreatSPN, Lola, PNXDD, and Tapaal on one P/T instance ($N = 3$).
[p] computed at MCC'2013 by GreatSPN, ITS-Tools, Marcie, and PNXDD; confirmed at MCC'2014 by GreatSPN on the colored net instance, and by GreatSPN, Marcie, PNMC, PNXDD, Stratagem, and Tapaal.
[q] computed at MCC'2014 by MArcie.
[r] computed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
[s] computed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
[t] computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by GreatSPN on the colored net instance.
[u] computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by GreatSPN on the colored net instance.
[v] computed at MCC'2014 by GreatSPN on the colored net instance.
[w] computed at MCC'2014 by GreatSPN on the colored net instance.