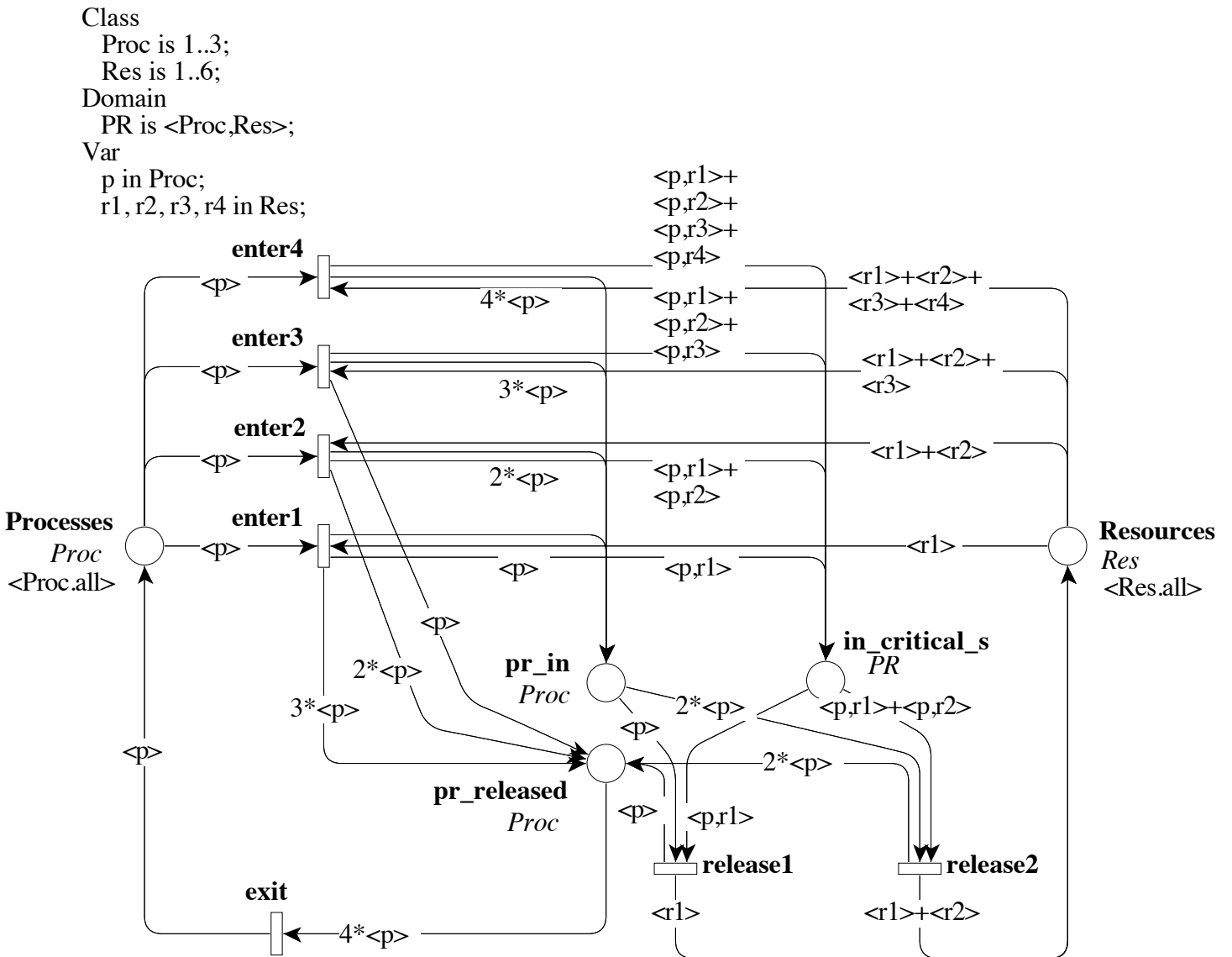


*This form is a summary description of the model entitled "Global Allocation Resource Management" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T 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.



## References

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

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

- free choice** — all (different) transitions with a shared input place have no other input place ..... ✗ (a)
- state machine** — every transition has exactly one input place and exactly one output place ..... ✗ (b)
- marked graph** — every place has exactly one input transition and exactly one output transition ..... ✗ (c)
- connected** — there is a undirected path between every two nodes (places or transitions) ..... ✓ (d)
- strongly connected** — there is a directed path between every two nodes (places or transitions) ..... ✓ (e)
- source place(s)** — one or more places have no input transitions ..... ✗ (f)
- sink place(s)** — one or more places have no output transitions ..... ✗ (g)
- source transition(s)** — one or more transitions have no input places ..... ✗ (h)
- sink transitions(s)** — one or more transitions have no output places ..... ✗ (i)
- loop-free** — no transition has an input place that is also an output place ..... ✓ (j)
- conservative** — for each transition, the number of input arcs equals the number of output arcs ..... ✗ (k)
- subconservative** — for each transition, the number of input arcs equals or exceeds the number of output arcs ..... ✗ (l)

(a) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (b) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (c) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (d) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (e) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (f) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (g) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (h) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (i) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (j) stated by [CÆSAR.BDD](#) version 1.7 on all 3 instances (3, 5, and 6).  
 (k) stated by [PNML2NUPN](#) 1.3.0 on all 3 instances (3, 5, and 6).  
 (l) stated by [PNML2NUPN](#) 1.3.0 on all 3 instances (3, 5, and 6).

## 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* ..... ✗<sup>(m)</sup>  
**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 reach-able markings         | Number of tran-sition firings | Max. number of tokens per place | Max. number of tokens per marking |
|-----------|---------------------------------------|-------------------------------|---------------------------------|-----------------------------------|
| $n = 3$   | 6 320 <sup>(n)</sup>                  | ?                             | ?                               | $\geq 9$ <sup>(o)</sup>           |
| $n = 5$   | $1.066 \times 10^8$ <sup>(p)</sup>    | ?                             | ?                               | $\geq 15$                         |
| $n = 6$   | $2.572 \times 10^{10}$ <sup>(q)</sup> | ?                             | ?                               | $\geq 18$                         |

<sup>(m)</sup> checked by the Crocodile tool in 2012, see reference 1.

<sup>(n)</sup> Computed by greatSPN, ITS-Tools, marcie, and pnxdd at MCC'2013.

<sup>(o)</sup> lower bound given by the number of initial tokens.

<sup>(p)</sup> Computed by ITS-Tools at MCC'2013.

<sup>(q)</sup> Computed by ITS-Tools at MCC'2013.