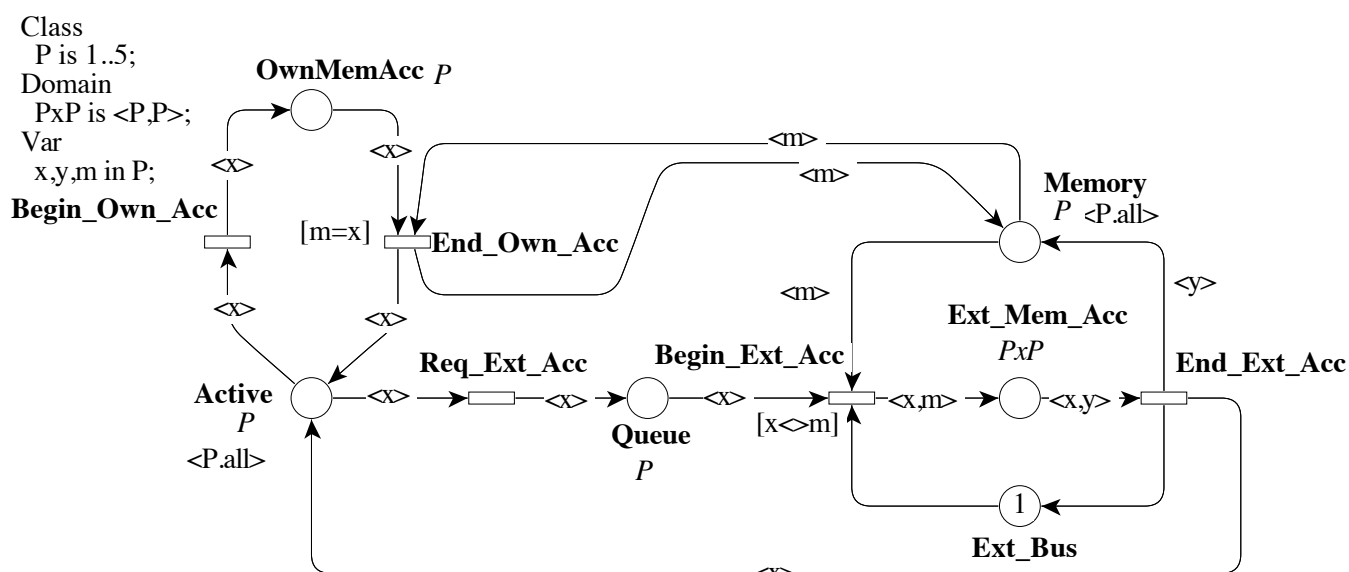


*This form is a summary description of the model entitled "SharedMemory" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given together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

## Description

This model is an example extracted from a paper on GreatSPN. It models a system composed of  $P$  processors, each one with a local memory. Each processor can access its local memory using a dedicated local bus and the other memories using a unique shared bus. The processor accessing a remote memory have priority on those accessing their own memory. It is assumed that external access request causes preemption of the owner processor eventually accessing its local memory.



## References

<http://dblp.uni-trier.de/rec/bibtex/conf/pnpm/ChiolaF89>

## Scaling parameter

Parameter name	Parameter description	Chosen parameter values
$P$	$P$ is the number of processors. Initial markings of places Active and Memory are impacted.	5, 10, 20, 50, 100, 200, 500, 1 000, 2 000, 5 000, 10 000, 20 000, 50 000, 100 000

## Size of the colored net model

number of places: 6  
 number of transitions: 5  
 number of arcs: 16

## Size of the derived P/T model instances

Parameter	Number of places	Number of transitions	Number of arcs
$P = 5$	41	55	200
$P = 10$	131	210	800
$P = 20$	461	820	3200
$P = 50$	2651	5050	20000
$P = 100$	10301	20100	80000
$P = 200$	40601	80200	320000

## Structural properties

- ordinary** — all arcs have multiplicity one ..... ✓
- simple 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 an 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)
- nested units** — places are structured into hierarchically nested sequential units<sup>(m)</sup> ..... ✗

## Behavioural properties

- safe** — in every reachable marking, there is no more than one token on a place ..... ✓ (n)
- 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 ..... ? (p)
- live** — for every transition  $t$ , from every reachable marking, one can reach a marking in which  $t$  can fire ..... ?

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(a) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (b) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (c) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (d) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (e) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (f) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (g) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (h) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (i) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (j) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (k) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (l) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (m) the definition of Nested-Unit Petri Nets (NUPN) is available from <http://mcc.lip6.fr/nupn.php>  
 (n) stated by [CÆSAR.BDD](#) version 2.0 to be true on 3 instance(s) out of 6, and unknown on the remaining 3 instance(s).  
 (o) stated by [CÆSAR.BDD](#) version 2.0 to be false on 3 instance(s) out of 6, and unknown on the remaining 3 instance(s); confirmed at MCC'2014 by Cunf, GreatSPN, Lola, and Tapaal on nearly half of the P/T instances.  
 (p) stated by [CÆSAR.BDD](#) version 2.0 to be true on 3 instance(s) out of 6, and unknown on the remaining 3 instance(s).

## 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
$P = 5$	1 863 <sup>(q)</sup>	10395 <sup>(r)</sup>	1 <sup>(s)</sup>	11 <sup>(t)</sup>
$P = 10$	1.8305E+6 <sup>(u)</sup>	1.9486E+7 <sup>(v)</sup>	1 <sup>(w)</sup>	21 <sup>(x)</sup>
$P = 20$	4.451E+11 <sup>(y)</sup>	9.1974E+12 <sup>(z)</sup>	1 <sup>(aa)</sup>	41 <sup>(ab)</sup>
$P = 50$	5.870E+26 <sup>(ac)</sup>	?	1 <sup>(ad)</sup>	101 <sup>(ae)</sup>
$P = 100$	1.701E+51 <sup>(af)</sup>	?	1 <sup>(ag)</sup>	201 <sup>(ah)</sup>
$P = 200$	3.524E+99 <sup>(ai)</sup>	?	?	?
$P = 500$	3.02E+243 <sup>(aj)</sup>	?	?	?

<sup>(q)</sup> computed at MCC'2013 by Alpina, GreatSPN, ITS-Tools, Marcie, Neco, and PNxDD; confirmed by [CÆSAR.BDD](#) version 1.8; confirmed at MCC'2014 by Helena on the colored net instance, and by GreatSPN, Marcie, PNMC, PNxDD, Stratagem, and Tapaal on the P/T net instance.

<sup>(r)</sup> computed at MCC'2014 by Helena on the colored net instance, and by Marcie on the P/T net instance.

<sup>(s)</sup> confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.

<sup>(t)</sup> confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.

<sup>(u)</sup> computed at MCC'2013 by Alpina, GreatSPN, ITS-Tools, Marcie, Neco, and PNxDD; confirmed by [CÆSAR.BDD](#) version 1.8; confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, PNxDD, and Stratagem.

<sup>(v)</sup> computed at MCC'2014 by Marcie.

<sup>(w)</sup> confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.

<sup>(x)</sup> confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.

<sup>(y)</sup> computed at MCC'2013 by ITS-Tools, Marcie, and PNxDD; confirmed by [CÆSAR.BDD](#) version 1.8; confirmed at MCC'2014 by Marcie, PNMC, PNxDD, and Stratagem.

<sup>(z)</sup> computed at MCC'2014 by Marcie.

<sup>(aa)</sup> confirmed at MCC'2014 by Marcie and PNMC.

<sup>(ab)</sup> confirmed at MCC'2014 by Marcie and PNMC.

<sup>(ac)</sup> computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by PNMC.

<sup>(ad)</sup> computed at MCC'2014 by PNMC.

<sup>(ae)</sup> computed at MCC'2014 by PNMC.

<sup>(af)</sup> computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by PNMC.

<sup>(ag)</sup> computed at MCC'2014 by PNMC.

<sup>(ah)</sup> computed at MCC'2014 by PNMC.

<sup>(ai)</sup> computed at MCC'2013 by ITS-Tools.

<sup>(aj)</sup> computed at MCC'2013 by ITS-Tools.