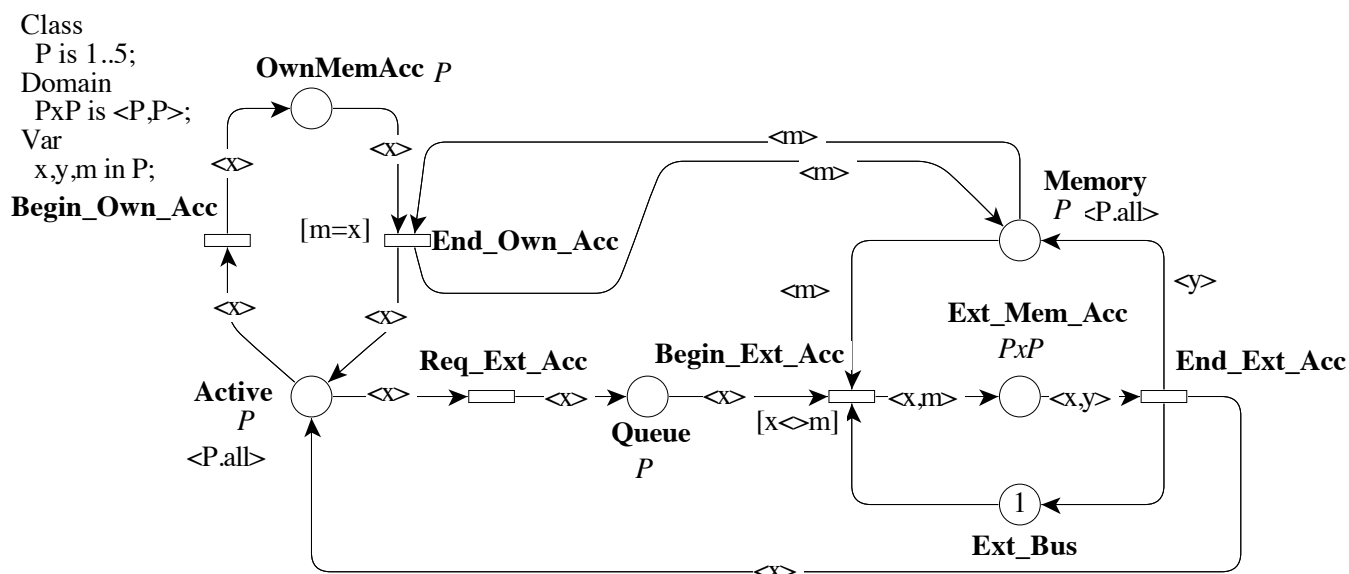


*This form is a summary description of the model entitled "SharedMemory" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given together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

*In March 2020, Pierre Bowier and Hubert Garavel provided a decomposition of all instances of this model into networks of communicating automata. Each network is expressed as a Nested-Unit Petri Net (NUPN) that can be found, for each instance, in the "toolspecific" section of the corresponding PNML file.*



## 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	Number of units	HWB code
$P = 5$	41	55	200	12	1-11-20
$P = 10$	131	210	800	22	1-21-37
$P = 20$	461	820	3200	42	1-41-69
$P = 50$	2651	5050	20000	102	1-101-162
$P = 100$	10301	20100	80000	202	1-201-314
$P = 200$	40601	80200	320000	402	1-401-616

## Structural properties

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

## Behavioural properties

<b>safe</b> — in every reachable marking, there is no more than one token on a place .....	✓ (o)
<b>dead place(s)</b> — one or more places have no token in any reachable marking .....	? (p)
<b>dead transition(s)</b> — one or more transitions cannot fire from any reachable marking .....	? (q)
<b>deadlock</b> — there exists a reachable marking from which no transition can be fired .....	? (r)
<b>reversible</b> — from every reachable marking, there is a transition path going back to the initial marking .....	? (s)
<b>live</b> — for every transition $t$ , from every reachable marking, one can reach a marking in which $t$ can fire .....	? (t)

(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 2.6 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) stated by [CÆSAR.BDD](#) version 1.7 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (n) the definition of Nested-Unit Petri Nets (NUPN) is available from <http://mcc.lip6.fr/nupn.php>  
 (o) stated by [CÆSAR.BDD](#) version 3.3 on all 6 instances (5, 10, 20, 50, 100, and 200).  
 (p) stated by [CÆSAR.BDD](#) version 3.3 to be false on 5 instance(s) out of 6, and unknown on the remaining 1 instance(s).  
 (q) stated by [CÆSAR.BDD](#) version 3.3 to be false on 4 instance(s) out of 6, and unknown on the remaining 2 instance(s).  
 (r) stated by [CÆSAR.BDD](#) version 2.0 to be false on 4 instance(s) out of 6, and unknown on the remaining 2 instance(s); confirmed at MCC'2014 by Cunf, GreatSPN, Lola, and Tapaal on nearly half of the P/T instances.

## 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>(s)</sup>	10395 <sup>(t)</sup>	1 <sup>(u)</sup>	11 <sup>(v)</sup>
$P = 10$	1.8305E+6 <sup>(w)</sup>	1.9486E+7 <sup>(x)</sup>	1 <sup>(y)</sup>	21 <sup>(z)</sup>
$P = 20$	4.451E+11 <sup>(aa)</sup>	9.1974E+12 <sup>(ab)</sup>	1 <sup>(ac)</sup>	41 <sup>(ad)</sup>
$P = 50$	5.870E+26 <sup>(ae)</sup>	?	1 <sup>(af)</sup>	101 <sup>(ag)</sup>
$P = 100$	1.701E+51 <sup>(ah)</sup>	?	1 <sup>(ai)</sup>	201 <sup>(aj)</sup>
$P = 200$	3.524E+99 <sup>(ak)</sup>	?	1 <sup>(al)</sup>	401

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

<sup>(al)</sup> stated by [CÆSAR.BDD](#) version 3.3.