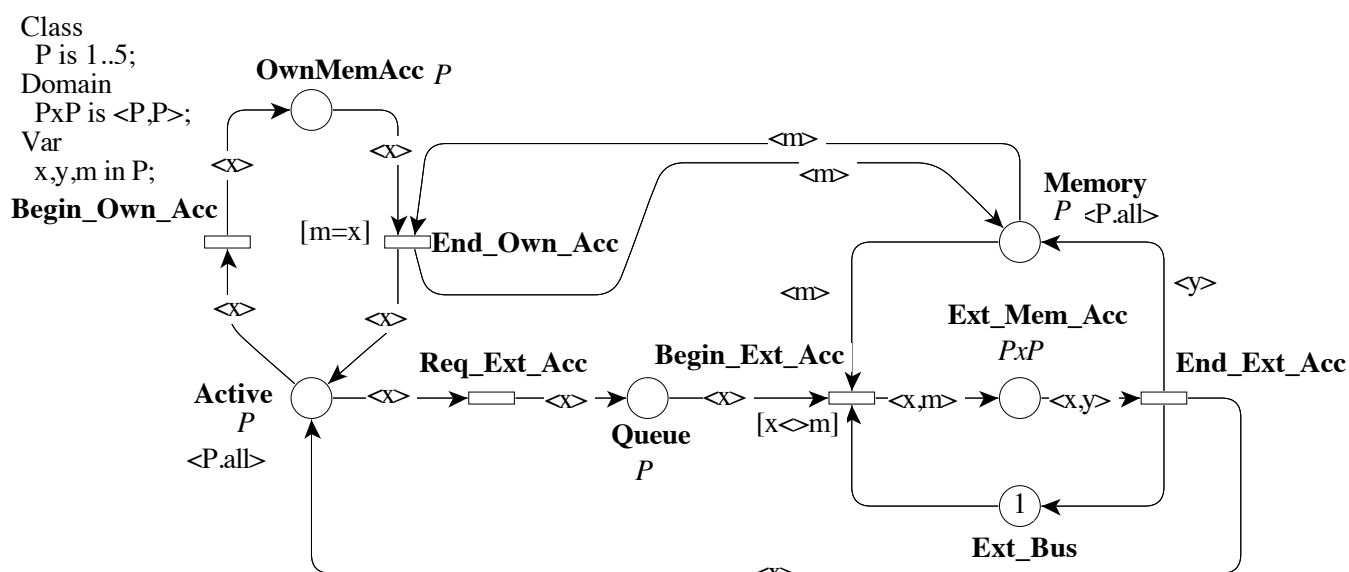


This form is a summary description of the model entitled "SharedMemory" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given together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

Behavioural properties

safe — in every reachable marking, there is no more than one token on a place	✓ (o)
deadlock — there exists a reachable marking from which no transition can be fired	? (p)
reversible — from every reachable marking, there is a transition path going back to the initial marking	? (q)
quasi-live — for every transition t , there exists a reachable marking in which t can fire	? (r)
live — for every transition t , from every reachable marking, one can reach a marking in which t can fire	? (s)

(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 2.0 to be true on 3 instance(s) out of 6, and unknown on the remaining 3 instance(s).

(p) 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.

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

^(r) 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.

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

^(t) confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.

^(u) confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.

^(v) 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.

^(w) computed at MCC'2014 by Marcie.

^(x) confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.

^(y) confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.

^(z) 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.

^(aa) computed at MCC'2014 by Marcie.

^(ab) confirmed at MCC'2014 by Marcie and PNMC.

^(ac) confirmed at MCC'2014 by Marcie and PNMC.

^(ad) computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by PNMC.

^(ae) computed at MCC'2014 by PNMC.

^(af) computed at MCC'2014 by PNMC.

^(ag) computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by PNMC.

^(ah) computed at MCC'2014 by PNMC.

^(ai) computed at MCC'2014 by PNMC.

^(aj) computed at MCC'2013 by ITS-Tools.

^(ak) computed at MCC'2013 by ITS-Tools.