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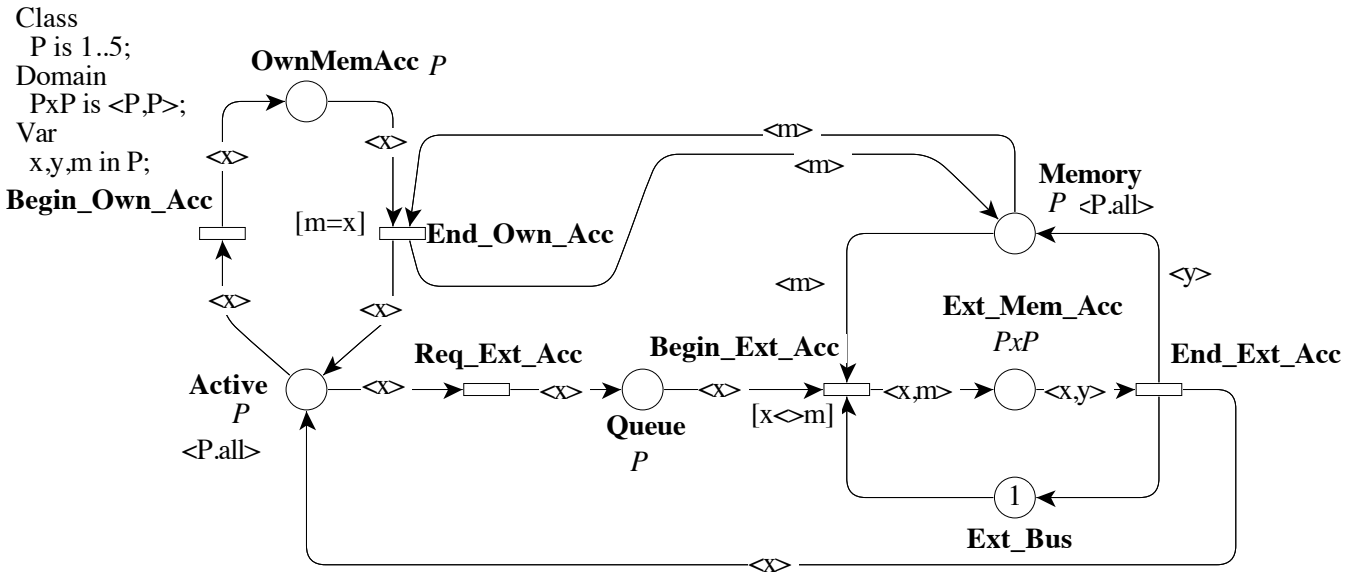
*This form is a summary description of the model entitled "SharedMemory" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given together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

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## 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

**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]
**dead place(s)** — *one or more places have no token in any reachable marking* ..... ? [p]
**dead transition(s)** — *one or more transitions cannot fire from any reachable marking* ..... ? [q]
**deadlock** — *there exists a reachable marking from which no transition can be fired* ..... ? [r]
**reversible** — *from every reachable marking, there is a transition path going back to the initial marking* ..... ?
**live** — *for every transition t, from every reachable marking, one can reach a marking in which t can fire* ..... ?

[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.

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## 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 |
|---|---|---|---|---|
| $P = 5$ | 1 863 [(s)] | 10395 [(t)] | 1 [(u)] | 11 [(v)] |
| $P = 10$ | 1.8305E+6 [(w)] | 1.9486E+7 [(x)] | 1 [(y)] | 21 [(z)] |
| $P = 20$ | 4.451E+11 [(aa)] | 9.1974E+12 [(ab)] | 1 [(ac)] | 41 [(ad)] |
| $P = 50$ | 5.870E+26 [(ae)] | ? | 1 [(af)] | 101 [(ag)] |
| $P = 100$ | 1.701E+51 [(ah)] | ? | 1 [(ai)] | 201 [(aj)] |
| $P = 200$ | 3.524E+99 [(ak)] | ? | 1 [(al)] | 401 |

(s) 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.
(t) computed at MCC'2014 by Helena on the colored net instance, and by Marcie on the P/T net instance.
(u) confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
(v) confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
(w) 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.
(x) computed at MCC'2014 by Marcie.
(y) confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.
(z) confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.
(aa) 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.
(ab) computed at MCC'2014 by Marcie.
(ac) confirmed at MCC'2014 by Marcie and PNMC.
(ad) confirmed at MCC'2014 by Marcie and PNMC.
(ae) computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by PNMC.
(af) computed at MCC'2014 by PNMC.
(ag) computed at MCC'2014 by PNMC.
(ah) computed at MCC'2013 by ITS-Tools; confirmed at MCC'2014 by PNMC.
(ai) computed at MCC'2014 by PNMC.
(aj) computed at MCC'2014 by PNMC.
(ak) computed at MCC'2013 by ITS-Tools.
(al) stated by CÆSAR.BDD version 3.3.