

This form is a summary description of the model entitled “RingSingleMessageInMbox” 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

The model comes from a suite of 50 examples that come from the analysis of Erlang programs [1]. They were generated in [2] using an Erlang verification tool called Soter, using the example programs found on Soter’s website [6].

The source model has an initial marking ($l_0 \geq 1$) constraint rather than a single initial marking, this is used in the MCC to scale the model up. The depth parameter corresponds to the unrolling depth used for loops.

Models found in [4] where converted to PNML thanks to an ITS-Tools [5] library.

References

1. Emanuele D’Osualdo and Jonathan Kochems and C.-H. Luke Ong. Automatic verification of erlang-style concurrency. CoRR, abs/1303.2201, 2013.
2. J. Esparza, R. Ledesma-Garza, R. Majumdar, P. J. Meyer, and F. Niksić. An smt-based approach to coverability analysis. In CAV, volume 8559 of Lecture Notes in Computer Science, pages 603–619. Springer, 2014
3. SOTER 0.1 web interface <http://mjolnir.cs.ox.ac.uk/soter/>
4. Klara J. Meyer, Petrinizer repository, <https://github.com/meyerphi/petrinizer>.
5. Y. Thierry-Mieg, Homepage of ITS-tools <https://lip6.github.io/ITSTools-web/>

Scaling parameter

Parameter name	Parameter description	Chosen parameter values
D, M	D is the depth and M is the number of tokens in place 10	(0, 5), (0, 10), (0, 20), (0, 40), (0, 80), (0, 160), (1, 5), (1, 10), (1, 20), (1, 40), (1, 80), (1, 160), (2, 5), (2, 10), (2, 20), (2, 40), (2, 80), (2, 160)

Size of the model

Parameter	Number of places	Number of transitions	Number of arcs
D=0, M=5	385	59	236
D=0, M=10	385	59	236
D=0, M=20	385	59	236
D=0, M=40	385	59	236
D=0, M=80	385	59	236
D=0, M=160	385	59	236
D=1, M=5	6690	11934	47736
D=1, M=10	6690	11934	47736
D=1, M=20	6690	11934	47736
D=1, M=40	6690	11934	47736
D=1, M=80	6690	11934	47736
D=1, M=160	6690	11934	47736
D=2, M=5	66950	213625	854500
D=2, M=10	66950	213625	854500
D=2, M=20	66950	213625	854500
D=2, M=40	66950	213625	854500
D=2, M=80	66950	213625	854500
D=2, M=160	66950	213625	854500

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⁾ ✗

(a) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(b) transitions “t1” and “t2” share a common input place “s1”, but only the former transition has input place “l0”.

(c) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(d) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(e) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(f) the net is not connected and, thus, not strongly connected.

(g) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(h) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(i) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(j) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(k) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(l) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(m) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

(n) the definition of Nested-Unit Petri Nets (NUPN) is available from <http://mcc.lip6.fr/nupn.php>

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* ?
deadlock — *there exists a reachable marking from which no transition can be fired* ?
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* ?

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
D=0, M=5	?	?	?	6 ^(q)
D=0, M=10	?	?	?	11 ^(r)
D=0, M=20	?	?	?	21 ^(s)
D=0, M=40	?	?	?	41 ^(t)
D=0, M=80	?	?	?	81 ^(u)
D=0, M=160	?	?	?	161 ^(v)
D=1, M=5	?	?	?	6 ^(w)
D=1, M=10	?	?	?	11 ^(x)
D=1, M=20	?	?	?	21 ^(y)
D=1, M=40	?	?	?	41 ^(z)
D=1, M=80	?	?	?	81 ^(aa)
D=1, M=160	?	?	?	161 ^(ab)
D=2, M=5	?	?	?	6 ^(ac)
D=2, M=10	?	?	?	11 ^(ad)
D=2, M=20	?	?	?	21 ^(ae)
D=2, M=40	?	?	?	41 ^(af)
D=2, M=80	?	?	?	81 ^(ag)
D=2, M=160	?	?	?	161 ^(ah)

^(o) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

^(p) stated by [CÆSAR.BDD](#) version 3.7 on all 18 instances (3 values of $D \times 6$ values of M).

^(q) number of initial tokens, because the net is conservative.

^(r) number of initial tokens, because the net is conservative.

^(s) number of initial tokens, because the net is conservative.

^(t) number of initial tokens, because the net is conservative.

^(u) number of initial tokens, because the net is conservative.

^(v) number of initial tokens, because the net is conservative.

^(w) number of initial tokens, because the net is conservative.

^(x) number of initial tokens, because the net is conservative.

^(y) number of initial tokens, because the net is conservative.

^(z) number of initial tokens, because the net is conservative.

^(aa) number of initial tokens, because the net is conservative.

^(ab) number of initial tokens, because the net is conservative.

^(ac) number of initial tokens, because the net is conservative.

^(ad) number of initial tokens, because the net is conservative.

^(ae) number of initial tokens, because the net is conservative.

^(af) number of initial tokens, because the net is conservative.

^(ag) number of initial tokens, because the net is conservative.

^(ah) number of initial tokens, because the net is conservative.