Model: DBSingleClientW
Type: P/T Net
Origin: Academic

since
MCC 2022

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This form is a summary description of the model entitled "DBSingleClientW" 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 [3].

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. Niksic. 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 of the instance and M the number of initial tokens in place **l0**	(0, 4), (0, 5), (0, 6), (0, 7), (0, 8), (0, 9), (0, 10), (1, 4), (1, 5), (1, 6), (1, 7), (1, 8), (1, 9), (1, 10), (2, 4), (2, 5), (2, 6), (2, 7), (2, 8), (2, 9), (2, 10)

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Size of the model

Parameter	Number of places	Number of transitions	Number of arcs
D=0, M=4	553	150	600
D=0, M=5	553	150	600
D=0, M=6	553	150	600
D=0, M=7	553	150	600
D=0, M=8	553	150	600
D=0, M=9	553	150	600
D=0, M=10	553	150	600
D=1, M=4	1440	672	2688
D=1, M=5	1440	672	2688
D=1, M=6	1440	672	2688
D=1, M=7	1440	672	2688
D=1, M=8	1440	672	2688
D=1, M=9	1440	672	2688
D=1, M=10	1440	672	2688
D=2, M=4	4763	2478	9912
D=2, M=5	4763	2478	9912
D=2, M=6	4763	2478	9912
D=2, M=7	4763	2478	9912
D=2, M=8	4763	2478	9912
D=2, M=9	4763	2478	9912
D=2, M=10	4763	2478	9912

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] .... ✘

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[a] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ 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 21 instances (3 values of $D \times 7$ values of M).

[d] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[e] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[f] the net is not connected and, thus, not strongly connected.

[g] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[h] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[i] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[j] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[k] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[l] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

[m] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).

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

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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 reachable markings	Number of transition firings	Max. number of tokens per place	Max. number of tokens per marking
D=0, M=4	?	?	?	5 [(q)]
D=0, M=5	?	?	?	6 [(r)]
D=0, M=6	?	?	?	7 [(s)]
D=0, M=7	?	?	?	8 [(t)]
D=0, M=8	?	?	?	9 [(u)]
D=0, M=9	?	?	?	10 [(v)]
D=0, M=1	?	?	?	11 [(w)]
D=1, M=4	?	?	?	5 [(x)]
D=1, M=5	?	?	?	6 [(y)]
D=1, M=6	?	?	?	7 [(z)]
D=1, M=7	?	?	?	8 [(aa)]
D=1, M=8	?	?	?	9 [(ab)]
D=1, M=9	?	?	?	10 [(ac)]
D=1, M=1	?	?	?	11 [(ad)]
D=2, M=4	?	?	?	5 [(ae)]
D=2, M=5	?	?	?	6 [(af)]
D=2, M=6	?	?	?	7 [(ag)]
D=2, M=7	?	?	?	8 [(ah)]
D=2, M=8	?	?	?	9 [(ai)]
D=2, M=9	?	?	?	10 [(aj)]
D=2, M=10	?	?	?	11 [(ak)]

[(o)] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ values of M).
[(p)] stated by CÆSAR.BDD version 3.7 on all 21 instances (3 values of $D \times 7$ 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.
[(ai)] number of initial tokens, because the net is conservative.
[(aj)] number of initial tokens, because the net is conservative.
[(ak)] number of initial tokens, because the net is conservative.

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