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This form is a summary description of the model entitled "RERS17pb113" 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

RERS17pb113 belongs to the parallel training problems of the RERS (Rigorous Examination of Reactive Systems) challenge in 2017 [(a)]. This model has been elaborated to preserve some properties by construction [1] and does not represent a real problem. However, it is built from patterns making it of interest to evaluate tools.

References

1 B. Steffen, M. Jasper, J. Meijer, and J. van de Pol. Property-preserving generation of tailored benchmark Petri nets. In 17th International Conference on Application of Concurrency to System Design, ACSD 2017, Zaragoza, Spain, June 25–30, 2017, pages 1–8.

Scaling parameter

Parameter name	Parameter description	Chosen parameter values
N	Initial Marking Multiplier	1, 2, 3, 4, 5, 6, 7, 8, 9

Size of the model

Although the model is parameterized, its size does not depend on parameter values.

number of places:	639
number of transitions:	31 353
number of arcs:	125 418

Structural properties

ordinary — *all arcs have multiplicity one* ..... ✔
simple free choice — *all transitions sharing a common input place have no other input place* ..... ✘ [(b)]
extended free choice — *all transitions sharing a common input place have the same input places* ..... ✘ [(c)]
state machine — *every transition has exactly one input place and exactly one output place* ..... ✘ [(d)]
marked graph — *every place has exactly one input transition and exactly one output transition* ..... ✘ [(e)]
connected — *there is an undirected path between every two nodes (places or transitions)* ..... ✔ [(f)]
strongly connected — *there is a directed path between every two nodes (places or transitions)* ..... ✘ [(g)]
source place(s) — *one or more places have no input transitions* ..... ✔ [(h)]
sink place(s) — *one or more places have no output transitions* ..... ✘ [(i)]

[(a)] See http://www.rers-challenge.org/2017/.
[(b)] 62688 arcs are not simple free choice, e.g., the arc from place "p77" (which has 52 outgoing transitions) to transition "t_19137_a50_SIGDEADLK" (which has 2 input places).
[(c)] transitions "t_19038_a50_SIGDEADLK" and "t_19137_a50_SIGDEADLK" share a common input place "p77", but only the former transition has input place "p204".
[(d)] 31345 transitions are not of a state machine, e.g., transition "t_14231_a9_SIGCONT".
[(e)] 639 places are not of a marked graph, e.g., place "p77".
[(f)] stated by CÆSAR.BDD version 2.8 on all 9 instances (1, 2, 3, 4, 5, 6, 7, 8, and 9).
[(g)] from place "p328" one cannot reach place "p132".
[(h)] there exist 13 source places, e.g., place "p132".
[(i)] stated by CÆSAR.BDD version 2.8 on all 9 instances (1, 2, 3, 4, 5, 6, 7, 8, and 9).

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source transition(s) — *one or more transitions have no input places* ..... ✗ (j)
sink transitions(s) — *one or more transitions have no output places* ..... ✗ (k)
loop-free — *no transition has an input place that is also an output place* ..... ✗ (l)
conservative — *for each transition, the number of input arcs equals the number of output arcs* ..... ✔ (m)
subconservative — *for each transition, the number of input arcs equals or exceeds the number of output arcs* ..... ✔ (n)
nested units — *places are structured into hierarchically nested sequential units* (o) ..... ? (p)

Behavioural properties

safe — *in every reachable marking, there is no more than one token on a place* ..... ? (q)
dead place(s) — *one or more places have no token in any reachable marking* ..... ?
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
$n = 1$	$\geq$ 9.70605e+06 (r)	?	1 (s)	13 (t)
$n = 2$	?	?	?	26 (u)
$n = 3$	?	?	?	39 (v)
$n = 4$	?	?	?	52 (w)
$n = 5$	?	?	?	65 (x)
$n = 6$	?	?	?	78 (y)
$n = 7$	?	?	?	91 (z)
$n = 8$	?	?	?	104 (aa)
$n = 9$	?	?	?	117 (ab)

(j) stated by CÆSAR.BDD version 2.8 on all 9 instances (1, 2, 3, 4, 5, 6, 7, 8, and 9).
(k) stated by CÆSAR.BDD version 2.8 on all 9 instances (1, 2, 3, 4, 5, 6, 7, 8, and 9).
(l) 13856 transitions are not loop free, e.g., transition "t_14231_a9_SIGCONT".
(m) stated by CÆSAR.BDD version 2.8 on all 9 instances (1, 2, 3, 4, 5, 6, 7, 8, and 9).
(n) stated by CÆSAR.BDD version 2.8 on all 9 instances (1, 2, 3, 4, 5, 6, 7, 8, and 9).
(o) the definition of Nested-Unit Petri Nets (NUPN) is available from http://mcc.lip6.fr/nupn.php
(p) ✔ for $N = 1$ (the unit-safeness property only holds for $N = 1$) and ✗ otherwise.
(q) The net is structurally safe when $N = 1$, otherwise it is not.
(r) stated by CÆSAR.BDD version 2.8.
(s) stated by PNML2NUPN 3.1.0.
(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.