

Size of the colored net model

number of places: 20
 number of transitions: 14
 number of arcs: 68

Size of the derived P/T model instances

Parameter	Number of places	Number of transitions	Number of arcs
$N = 3$	57	91	541
$N = 6$	144	451	2 968
$N = 10$	316	1 631	11 384
$N = 15$	621	4 771	34 549
$N = 20$	1 026	10 461	77 364

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)
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) ✗

Behavioural properties

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

(b) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(c) stated by CÆSAR.BDD version 2.6 on all 5 instances (see all aforementioned scaling parameter values).

(d) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(e) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(f) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(g) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(h) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(i) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(j) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(k) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(l) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(m) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

(n) stated by CÆSAR.BDD version 2.3 on all 5 instances (see all aforementioned scaling parameter values).

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

(p) stated by CÆSAR.BDD version 2.3 to be true on 1 instance(s) out of 5, and unknown on the remaining 4 instance(s).

(q) stated by CÆSAR.BDD version 2.3 to be false on 1 instance(s) out of 5, and unknown on the remaining 4 instance(s).

(r) stated by CÆSAR.BDD version 2.3 to be false on 1 instance(s) out of 5, and unknown on the remaining 4 instance(s).

live — for every transition t , from every reachable marking, one can reach a marking in which t can fire? ^(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
$N = 3$	4 650 ^(t)	12 888 ^(u)	1	$\in [11, 57]$ ^(v)
$N = 6$	6 816 756 ^(w)	29 904 912 ^(x)	?	≥ 17 ^(y)
$N = 10$	$\geq 9.8641e+06$ ^(z)	?	?	≥ 25 ^(aa)
$N = 15$?	?	?	≥ 35 ^(ab)
$N = 20$?	?	?	≥ 45 ^(ac)

^(s) stated by [CÆSAR.BDD](#) version 2.3 to be false on 1 instance(s) out of 5, and unknown on the remaining 4 instance(s).

^(t) computed by PROD in December 2014; confirmed by [CÆSAR.BDD](#) version 2.3.

^(u) computed with PROD on December 2014.

^(v) lower and upper bounds given by the number of initial tokens and the number of places.

^(w) computed by PROD in December 2014.

^(x) computed with PROD on December 2014.

^(y) lower bound given by the number of initial tokens.

^(z) stated by [CÆSAR.BDD](#) version 2.3.

^(aa) lower bound given by the number of initial tokens.

^(ab) lower bound given by the number of initial tokens.

^(ac) lower bound given by the number of initial tokens.