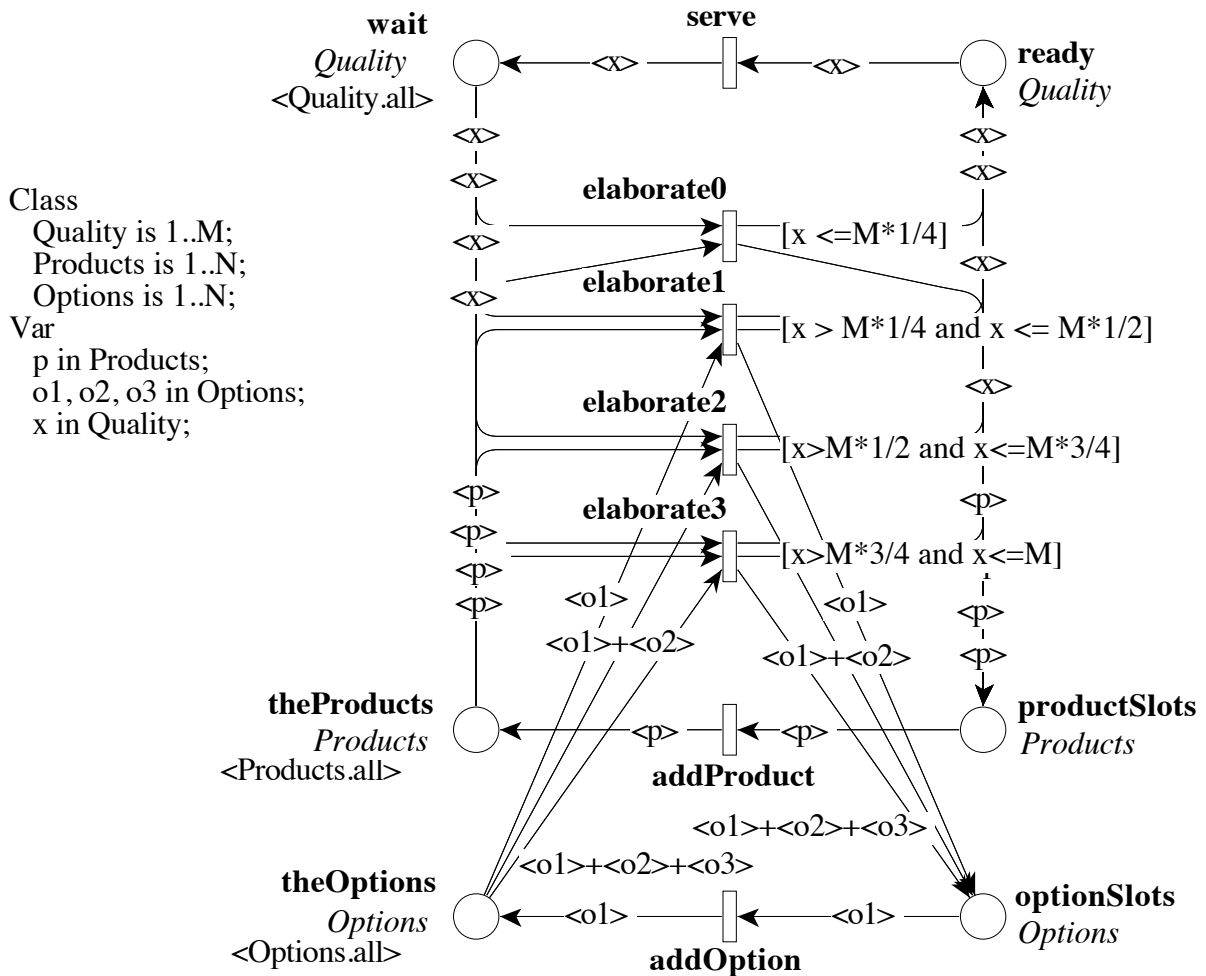


This form is a summary description of the model entitled "A hot drink vending machine" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given together with property files (possibly, one per model instance) giving a set of properties to be checked on the model.

Description

A Symmetric net modeling a simple hot drink vending machine. This model handles cycles of elaborations of a hot drink (*Products*). Each type of elaboration (modelled by the *elaborateX* transitions) carries a set of options (*Options*) for the product. For *elaborate0* the set of options is empty. Products and options are restaured from the places *productSlots* and *optionSlots*.

Each type of elaboration has an intrinsic quality level range (*Quality*), which is associated with the service. The cardinal of the set of quality levels is $M = 4 \times N$, N being the number of products.



Graphical representation of the model

References

Model adapted from: R. Muschevici, J. Proença, and D. Clarke. *Modular Modelling of Software Product Lines with Feature Nets*. In 9th International Conference on Software Engineering and Formal Methods (SEFM), volume 7041 of LNCS, pages 318–333. Springer, 2011

Scaling parameter

Parameter name	Parameter description	Chosen parameter values
N	Number of products	2, 10

Size of the colored net model

number of places: 6
 number of transitions: 7
 number of arcs: 28

Size of the derived P/T model instances

Parameter	Number of places	Number of transitions	Number of arcs
$N = 2$	24	72	440
$N = 10$	120	111160	1026520

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 ?

(a) the net is not ordinary in all its 2 instances (2 and 10).
 (b) the net is not ordinary in all its 2 instances (2 and 10).
 (c) the net is not ordinary in all its 2 instances (2 and 10).
 (d) the net is not ordinary in all its 2 instances (2 and 10).
 (e) stated by [CÆSAR.BDD](#) version 1.7 on all 2 instances (2 and 10).
 (f) stated by [CÆSAR.BDD](#) version 1.7 on all 2 instances (2 and 10).
 (g) stated by [CÆSAR.BDD](#) version 1.7 on all 2 instances (2 and 10).
 (h) stated by [CÆSAR.BDD](#) version 1.7 on all 2 instances (2 and 10).
 (i) stated by [CÆSAR.BDD](#) version 1.7 on all 2 instances (2 and 10).
 (j) stated by [CÆSAR.BDD](#) version 1.7 on all 2 instances (2 and 10).
 (k) stated by [CÆSAR.BDD](#) version 1.7 on all 2 instances (2 and 10).
 (l) stated by [PNML2NUPN](#) 1.3.0 on all 2 instances (2 and 10).
 (m) stated by [PNML2NUPN](#) 1.3.0 on all 2 instances (2 and 10).
 (n) the definition of Nested-Unit Petri Nets (NUPN) is available from <http://mcc.lip6.fr/nupn.php>
 (o) the colored nets are safe; the unfolded place-transition nets are deemed to be safe too, although they contain many arcs whose valuation (“inscription” in PNML) is greater than one.

- 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* ✗^(p)
- 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
$N = 2$	1 024 ^(q)	7680 ^(r)	1 ^(s)	12 ^(t)
$N = 10$	1.153×10^{18} ^(u)	?	?	60 ^(v)

^(p) confirmed at MCC'2014 by Helena on one colored instance ($N = 2$), and by Cunf, GreatSPN, Lola, PNXDD, and Tapaal on the corresponding P/T instance.

^(q) computed at MCC'2013 by Alpina, ITS-Tools, Marcie and PNXDD; confirmed at MCC'2014 by GreatSPN and Helena on the colored net instance, and by GreatSPN, Marcie, PNMC, PNXDD, Stratagem, and Tapaal on the P/T net instance.

^(r) computed at MCC'2014 by Helena on the colored net instance, and by Marcie on the P/T net instance.

^(s) computed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.

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

^(u) computed at MCC'2013 by Marcie.

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