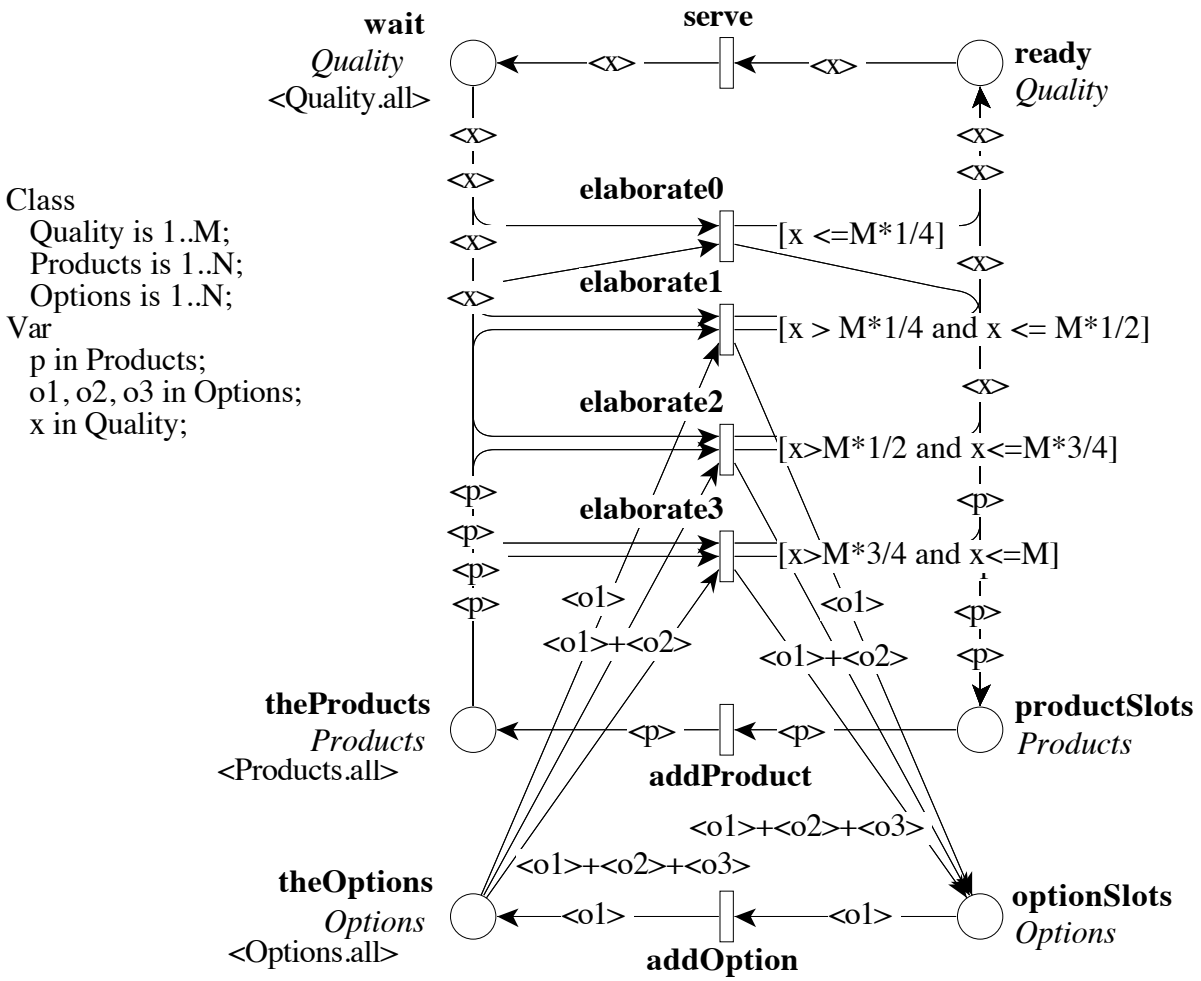
Lom Messan Hillah
Lom-Messan.Hillah@lip6.fr

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 9^{th} International Conference on Software Engineering and Formal Methods (SEFM), volume 7041 of LNCS, pages 318–333. Springer, 2011

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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.

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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.