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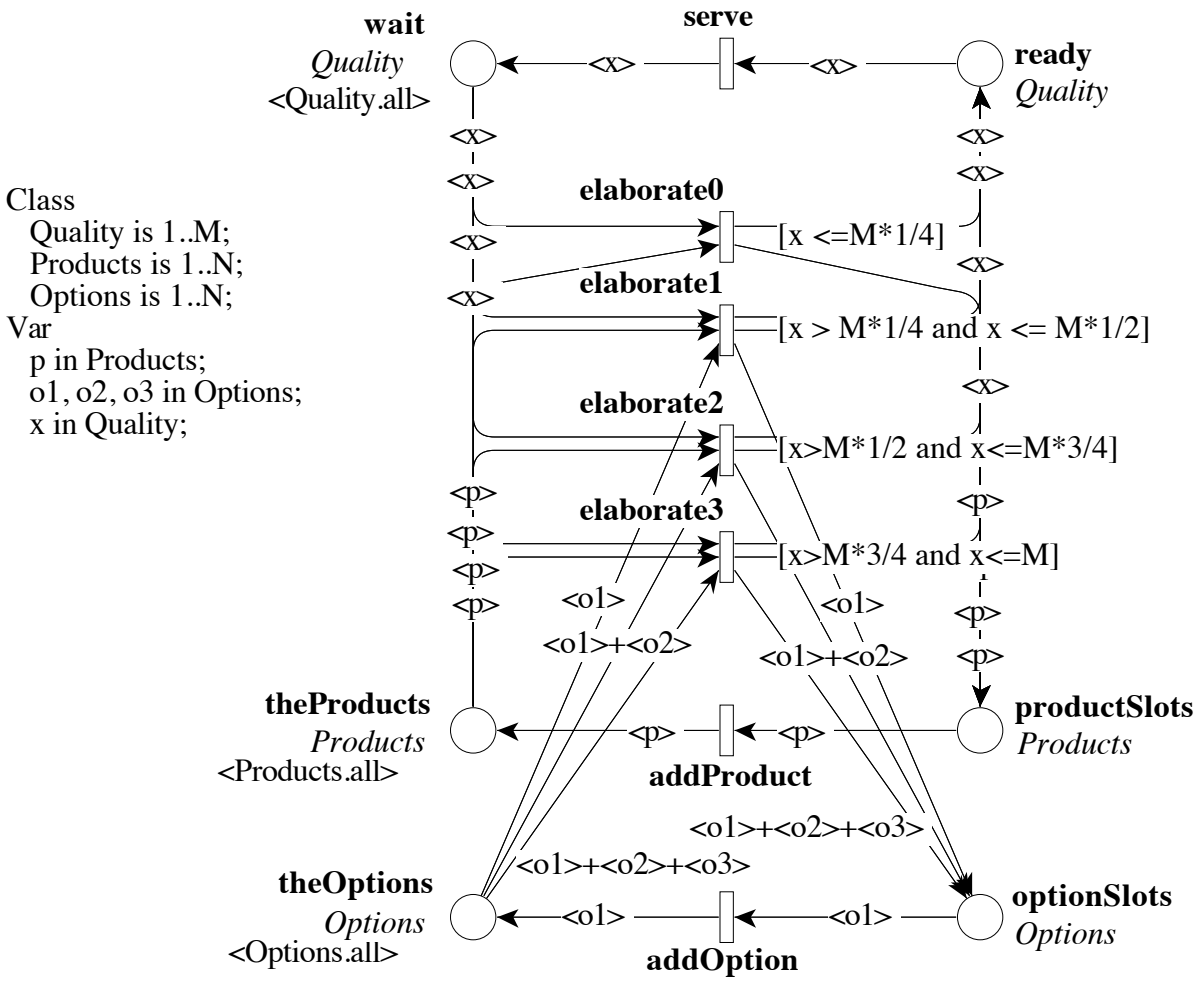
This form is a summary description of the model entitled "A hot drink vending machine" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models 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] ..... ✗

[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

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Behavioural properties

safe — *in every reachable marking, there is no more than one token on a place* ..... ✔ [o]
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* ..... ✔
quasi-live — *for every transition t, there exists a reachable marking in which t can fire* ..... ?
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]

[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.
[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.