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This form is a summary description of the model entitled "IBM703" 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

This model is the biggest one (in terms of places and transition) of a collection of 1386 Petri nets that were derived from industrial business process models that were provided by IBM. The Petri nets have workflow structure (unique source and sink place) and can be checked for soundness (marking the source place, does the CTL formula "AGEF sink" hold). More information on the models can be found in the referenced paper.

The soundness check is an ideal challenge for the model checking contest, because it can be performed by checking a CTL formula or by checking the short-circuited net for liveness and boundedness. This allows for generic as well as Petri net-specific approaches.

In March 2020, Pierre Bouvier and Hubert Garavel provided a decomposition of this model into a network of communicating automata. This network is expressed as a Nested-Unit Petri Net (NUPN) that can be found in the "toolspecific" section of the corresponding PNML file.

References

Dirk Fahland, Cédric Favre, Jana Koehler, Niels Lohmann, Hagen Völzer, and Karsten Wolf. **Instantaneous Soundness Checking of Industrial Business Process Models**. In Umeshwar Dayal, Johann Eder, Jana Koehler, and Hajo A. Reijers, editors, *Business Process Management, 7th International Conference, BPM 2009, Ulm, Germany, September 8-10, 2009, Proceedings*, volume 5701 of Lecture Notes in Computer Science, pages 278-293, September 2009. Springer-Verlag.

Scaling parameter

This model is not parameterized.

Size of the model

number of places:	262
number of transitions:	284
number of arcs:	572
number of units:	4
HWB code (*height-width-bits*):	1–3–16

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]

[a] stated by CÆSAR.BDD version 2.2.
[b] stated by CÆSAR.BDD version 2.6.
[c] 4 transitions are not of a state machine, e.g., transition "fork_s00000463_activate_s00000271".
[d] 51 places are not of a marked graph, e.g., place "task_s00000713_output_s00000264".
[e] stated by CÆSAR.BDD version 2.2.

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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* ..... ✗ (p)
dead transition(s) — *one or more transitions cannot fire from any reachable marking* ..... ✗ (q)
deadlock — *there exists a reachable marking from which no transition can be fired* ..... ✓ (r)
reversible — *from every reachable marking, there is a transition path going back to the initial marking* ..... ✗ (s)
live — *for every transition t, from every reachable marking, one can reach a marking in which t can fire* ..... ✗ (t)

Size of the marking graph

number of reachable markings:	8370 (u)
number of transition firings:	?
max. number of tokens per place:	1
max. number of tokens per marking:	∈ [2, 3] (v)

(f) from place “alpha” one cannot reach place “fork_s00000463_activated_s00000272”.
(g) place “alpha” is a source place.
(h) there exist 6 sink places, e.g., place “task_s00000713_output_s00000264”.
(i) stated by CÆSAR.BDD version 2.2.
(j) stated by CÆSAR.BDD version 2.2.
(k) stated by CÆSAR.BDD version 2.2.
(l) 4 transitions are not conservative, e.g., transition “fork_s00000463_activate_s00000271”.
(m) 4 transitions are not subconservative, e.g., transition “fork_s00000463_activate_s00000271”.
(n) the definition of Nested-Unit Petri Nets (NUPN) is available from http://mcc.lip6.fr/nupn.php
(o) stated by CÆSAR.BDD version 2.2.
(p) stated by CÆSAR.BDD version 3.3.
(q) stated by CÆSAR.BDD version 2.2.
(r) stated by CÆSAR.BDD version 2.2.
(s) the marking graph has deadlocks and contains more than one reachable marking.
(t) the net has at least one transition and its marking graph has deadlocks.
(u) stated by CÆSAR.BDD version 3.3.
(v) upper bound given by the number of leaf units.