since
MCC 2012

This form is a summary description of the model entitled "AI Planning" 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

The net models the equipment (displays, canvases, documents, and lamps) of a smart conference room of the University of Rostock. It was derived from a proprietary description format that was used by an AI planning tool to generated plans to bring the room in a desired state, for instance displaying a document on a certain canvas while switching off the lights. This problem can be expressed as a reachability problem.

An example for a reachable marking is

LightOn.<Lamp1|TRUE> = 1 AND
LightOn.<Lamp2|TRUE> = 1 AND
DocShown.<Doc1|LW3|TRUE> = 1 AND
DocShown.<Doc2|LW1|TRUE> = 1 AND
CanvasDown.<VD1|TRUE> = 1
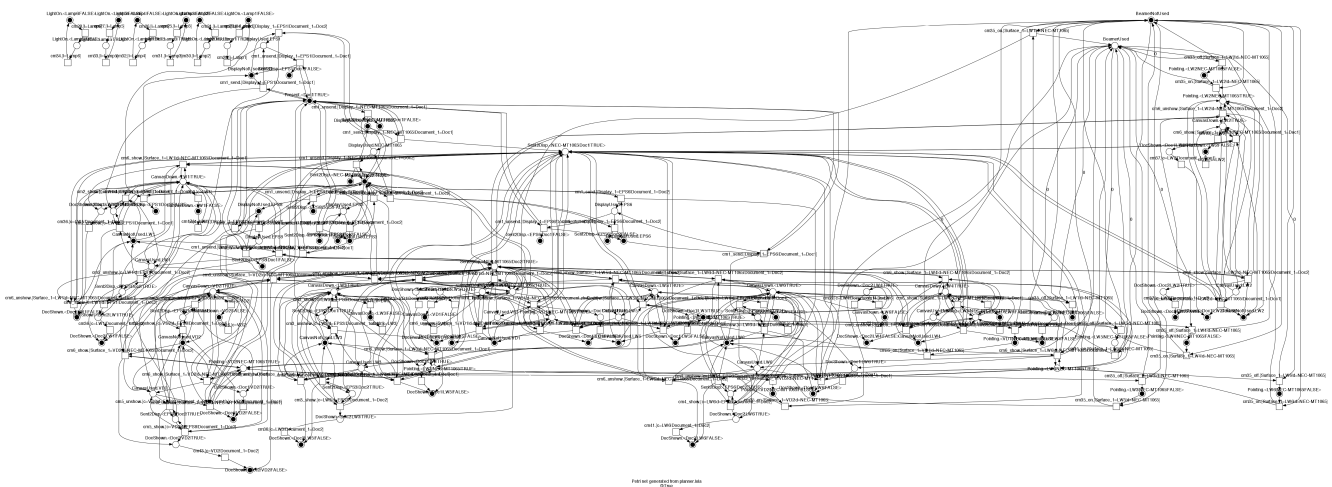
Scaling parameter

This model is not parameterized.

Size of the model

number of places:	126
number of transitions:	128
number of arcs:	652

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Model: AI Planning
Type: P/T Net
Origin: Industrial

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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)

deadlock — *there exists a reachable marking from which no transition can be fired* .... ?

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* .... ✔ (p)

live — *for every transition t, from every reachable marking, one can reach a marking in which t can fire* .... ?

Size of the marking graph

number of reachable markings:	∞
number of transition firings:	∞
max. number of tokens per place:	∞
max. number of tokens per marking:	∞

[(a)] 240 arcs are not simple free choice, e.g., the arc from place "p10" (which has 8 outgoing transitions) to transition "t33" (which has 2 input places).

[(b)] transitions "t40" and "t33" share a common input place "p10", but only the former transition has input place "p62".

[(c)] 84 transitions are not of a state machine, e.g., transition "t1".

[(d)] 90 places are not of a marked graph, e.g., place "p10".

[(e)] 12 places are not connected to place "p10", e.g., place "p37"; 12 transitions are not connected to place "p10", e.g., transition "t127".

[(f)] the net is not connected and, thus, not strongly connected.

[(g)] stated by CÆSAR.BDD version 1.7.

[(h)] there exist 26 sink places, e.g., place "p111".

[(i)] stated by CÆSAR.BDD version 1.7.

[(j)] stated by CÆSAR.BDD version 1.7.

[(k)] 68 transitions are not loop free, e.g., transition "t1".

[(l)] 68 transitions are not conservative, e.g., transition "t1".

[(m)] 68 transitions are not subconservative, e.g., transition "t1".

[(n)] the definition of Nested-Unit Petri Nets (NUPN) is available from http://mcc.lip6.fr/nupn.php

[(o)] firing transition "t20" puts a token in place "p88" although this place already has a token in the current marking.

[(p)] stated by CÆSAR.BDD version 2.0.

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