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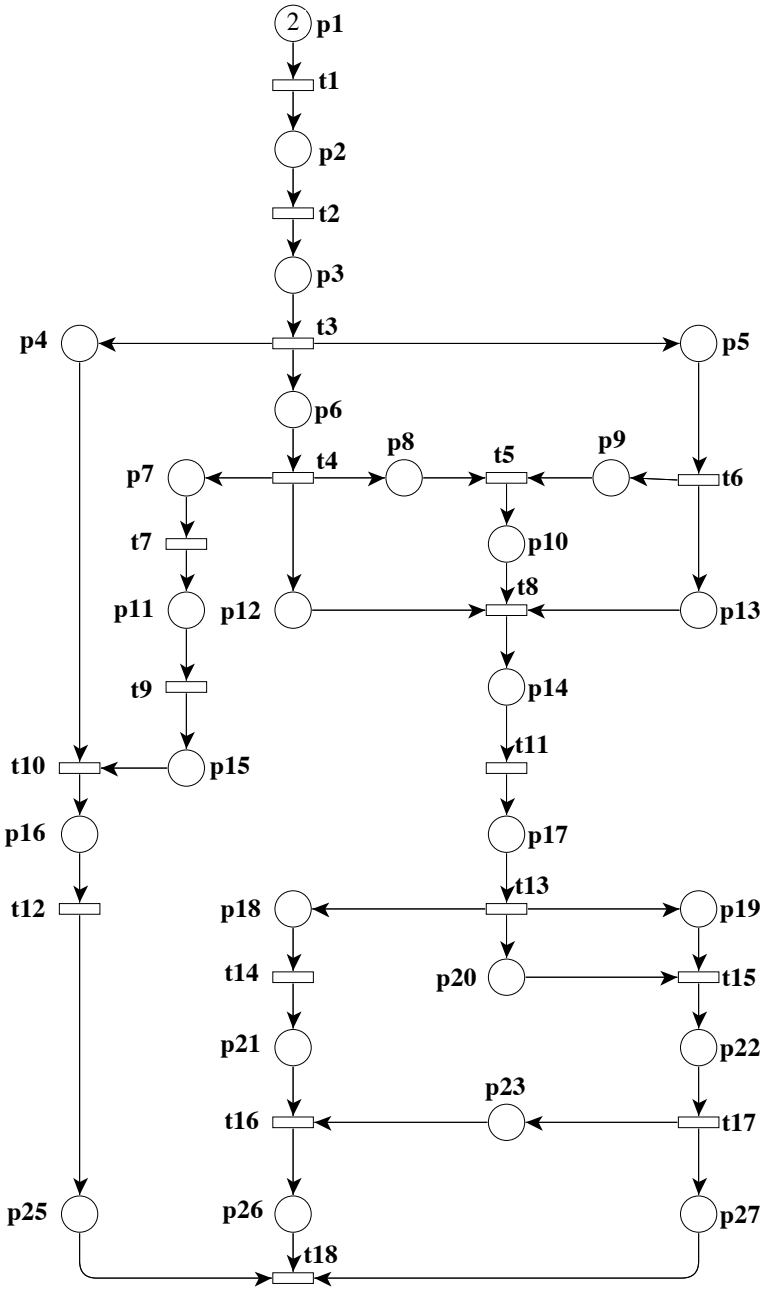
*This form is a summary description of the model entitled "HouseConstruction" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given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

## Description

This model has been extracted from the `petriweb.org` repository available at http://www.petriweb.org. According to the provided information, the net was designed by J. L. Peterson, from a PERT chart by F. Levy. The PERT chart contains timing information, which is not accurately translated.




*Graphical representation for $N = 2$*

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## References

This model was probably described in: Peterson, James Lyle (1981). *Petri Net Theory and the Modeling of Systems*. Prentice Hall. ISBN 0-13-661983-5. However, this was not checked, the book being unavailable in our library.

## Scaling parameter

| Parameter name | Parameter description | Chosen parameter values |
|---|---|---|
| $N$ | initial number of tokens on place p2 | 2, 5, 10, 20, 50, 100, 200, 500 |

## Size of the model

Although the model is parameterized, its size does not depend on parameter values.

number of places: 26
number of transitions: 18
number of arcs: 51

## Structural properties

**ordinary** — *all arcs have multiplicity one* ..... ✔
**simple free choice** — *all (different) transitions with a shared input place have no other input place* ..... ✔ (a)
**state machine** — *every transition has exactly one input place and exactly one output place* ..... ✘ (b)
**marked graph** — *every place has exactly one input transition and exactly one output transition* ..... ✘ (c)
**connected** — *there is an undirected path between every two nodes (places or transitions)* ..... ✔ (d)
**strongly connected** — *there is a directed path between every two nodes (places or transitions)* ..... ✘ (e)
**source place(s)** — *one or more places have no input transitions* ..... ✔ (f)
**sink place(s)** — *one or more places have no output transitions* ..... ✘ (g)
**source transition(s)** — *one or more transitions have no input places* ..... ✘ (h)
**sink transitions(s)** — *one or more transitions have no output places* ..... ✔ (i)
**loop-free** — *no transition has an input place that is also an output place* ..... ✔ (j)
**conservative** — *for each transition, the number of input arcs equals the number of output arcs* ..... ✘ (k)
**subconservative** — *for each transition, the number of input arcs equals or exceeds the number of output arcs* ..... ✘ (l)
**nested units** — *places are structured into hierarchically nested sequential units* (m) ..... ✘

## Behavioural properties

**safe** — *in every reachable marking, there is no more than one token on a place* ..... ✘ (n)
**deadlock** — *there exists a reachable marking from which no transition can be fired* ..... ✔ (o)
**reversible** — *from every reachable marking, there is a transition path going back to the initial marking* ..... ✘

(a) stated by CÆSAR.BDD version 1.7 on all 8 instances (2, 5, 10, 20, 50, 100, 200, and 500).
(b) 11 transitions are not of a state machine, e.g., transition "t3".
(c) place "p1" is not of a marked graph.
(d) stated by CÆSAR.BDD version 1.7 on all 8 instances (2, 5, 10, 20, 50, 100, 200, and 500).
(e) from place "p2" one cannot reach place "p1".
(f) place "p1" is a source place.
(g) stated by CÆSAR.BDD version 1.7 on all 8 instances (2, 5, 10, 20, 50, 100, 200, and 500).
(h) stated by CÆSAR.BDD version 1.7 on all 8 instances (2, 5, 10, 20, 50, 100, 200, and 500).
(i) transition "t18" is a sink transition.
(j) stated by CÆSAR.BDD version 1.7 on all 8 instances (2, 5, 10, 20, 50, 100, 200, and 500).
(k) 11 transitions are not conservative, e.g., transition "t3".
(l) 5 transitions are not subconservative, e.g., transition "t3".
(m) the definition of Nested-Unit Petri Nets (NUPN) is available from http://mcc.lip6.fr/nupn.php
(n) in the initial marking, some places have several tokens (the number of which depends on $N$).
(o) confirmed at MCC'2014 by Lola and Tapaal on all 8 instances, and by GreatSPN on 4 instances.

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**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 graphs

| Parameter | Number of reachable markings | Number of transition firings | Max. number of tokens per place | Max. number of tokens per marking |
|---|---|---|---|---|
| $N = 2$ | 1501 [q] | 4780 [r] | 2 [s] | 12 [t] |
| $N = 5$ | 1.1880E+6 [u] | 7.1911E+6 [v] | 5 [w] | 30 [x] |
| $N = 10$ | 1.6636E+9 [y] | 1.4808E+10 [z] | 10 [aa] | 60 [ab] |
| $N = 20$ | 1.3666E+13 [ac] | 1.6144E+14 [ad] | 20 [ae] | 120 [af] |
| $N = 50$ | 1.5682E+19 [ag] | ? | 50 [ah] | 300 [ai] |

[p] stated by CÆSAR.BDD version 2.0 on all 8 instances (2, 5, 10, 20, 50, 100, 200, and 500).
[q] computed at MCC'2013 by Alpina, ITS-Tools, Marcie, Neco, and PNXDD; confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, PNXDD, Strategem, and Tapaal.
[r] computed at MCC'2014 by Marcie.
[s] computed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
[t] computed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
[u] computed at MCC'2013 by Alpina, ITS-Tools, Marcie, Neco, and PNXDD; exact value: 1 187 984; confirmed at MCC'2014 by GreatSPN, Marcie, PNMC, PNXDD, Stratagem, and Tapaal.
[v] computed at MCC'2014 by Marcie.
[w] computed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
[x] computed at MCC'2014 by GreatSPN, Marcie, PNMC, and Tapaal.
[y] computed at MCC'2013 by ITS-Tools, Marcie, and PNXDD; confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.
[z] computed at MCC'2014 by Marcie.
[aa] computed at MCC'2014 by GreatSPN, Marcie, and PNMC.
[ab] computed at MCC'2014 by GreatSPN, Marcie, and PNMC.
[ac] computed at MCC'2013 by ITS-Tools, and Marcie; confirmed at MCC'2014 by GreatSPN, Marcie, and PNMC.
[ad] computed at MCC'2014 by Marcie.
[ae] computed at MCC'2014 by GreatSPN, Marcie, and PNMC.
[af] computed at MCC'2014 by GreatSPN, Marcie, and PNMC.
[ag] computed at MCC'2014 by GreatSPN.
[ah] computed at MCC'2014 by GreatSPN.
[ai] computed at MCC'2014 by GreatSPN.