Discrete and continuous dynamic systems

PIPE

Petri net editor and analysis tool

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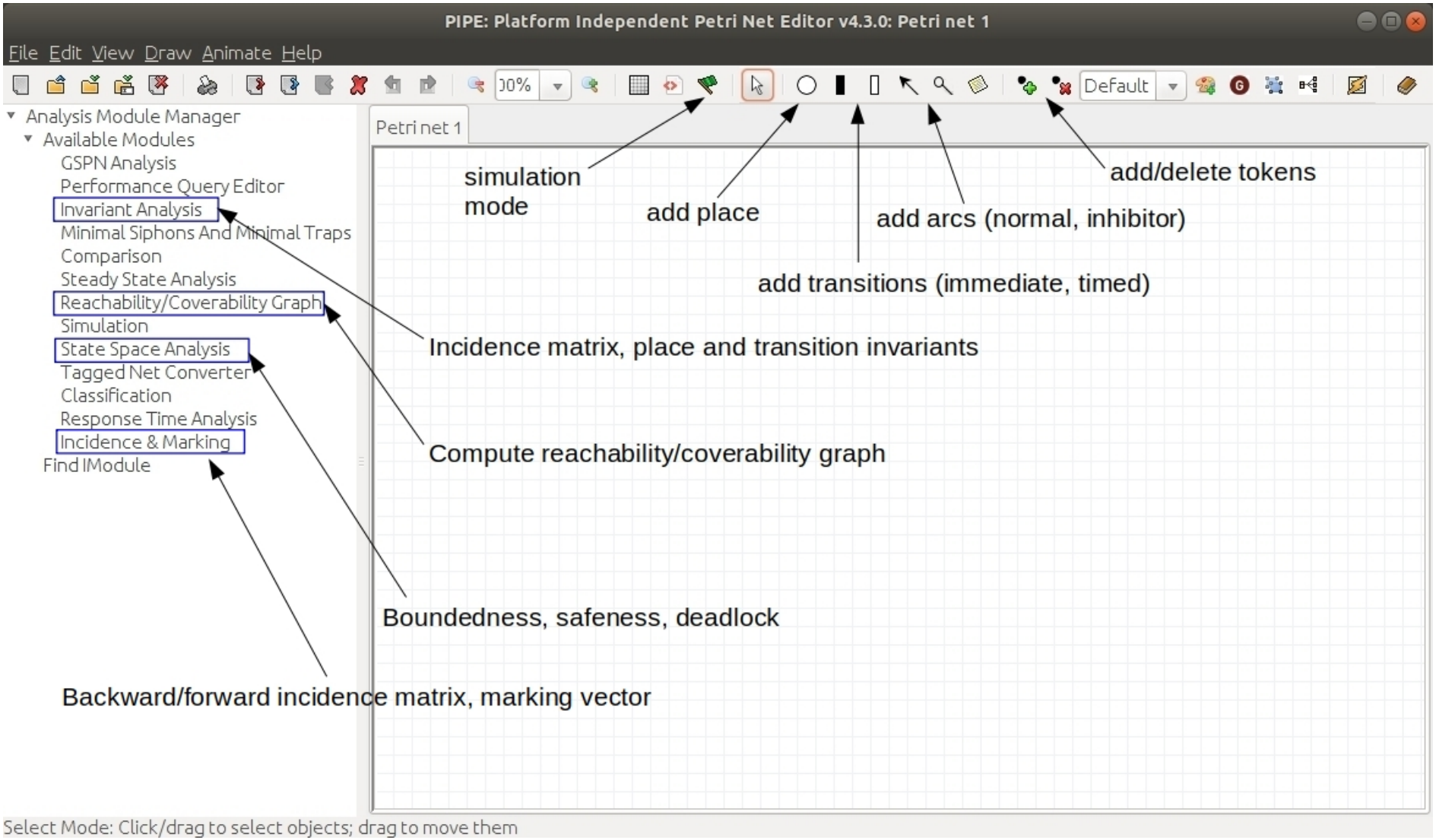
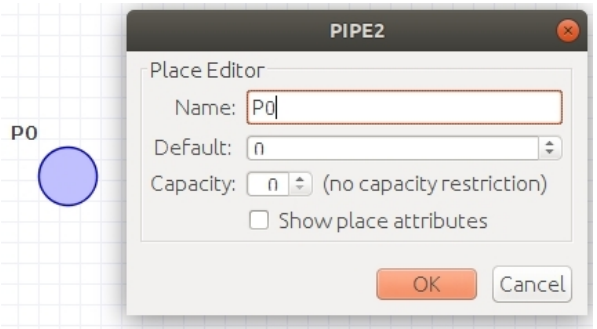
PIPE - Platform Independent Petri Net Editor

- Source
  - `https://sourceforge.net/projects/pipe2/files/PIPEv4/PIPEv4.3.0/` (lates stable version)
- Constructing Petri nets
  - simple Petri nets
  - places with capacity
  - arc weights, inhibitor arcs
  - timed, prioritized transitions
  - "colored" tokens - NOT CPN!
- Simulation
  -
- Analysis
  - Incidence matrix, invariant analysis
  - Reachability graph
  - State space analysis (boundedness, safeness, deadlocks)
- Documentation:
  `http://sarahtattersall.github.io/PIPE/user_guide.html`

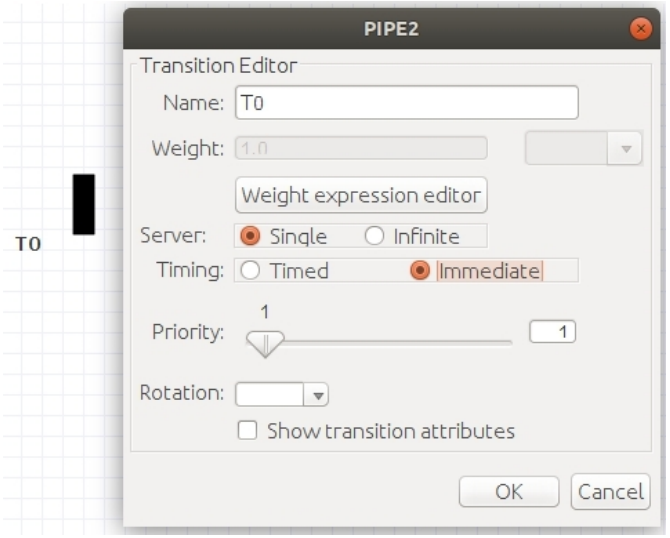
User interface



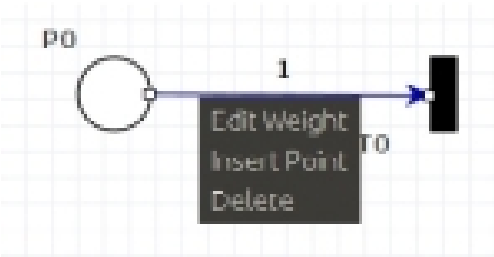
Constructing a Petri net



properties of a place:
name, default tokens, capacity



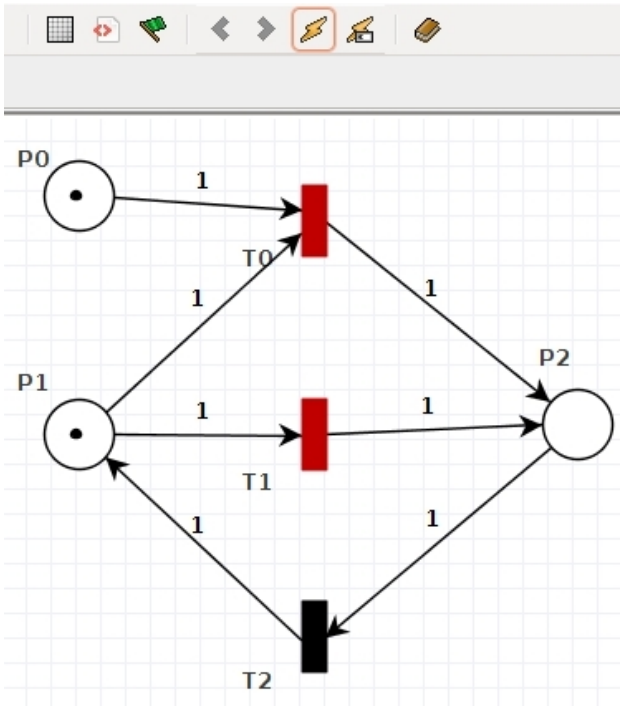
properties of a transition:
name, (weight), timing, priority



properties of an arc:
weight, bend points

Simulation

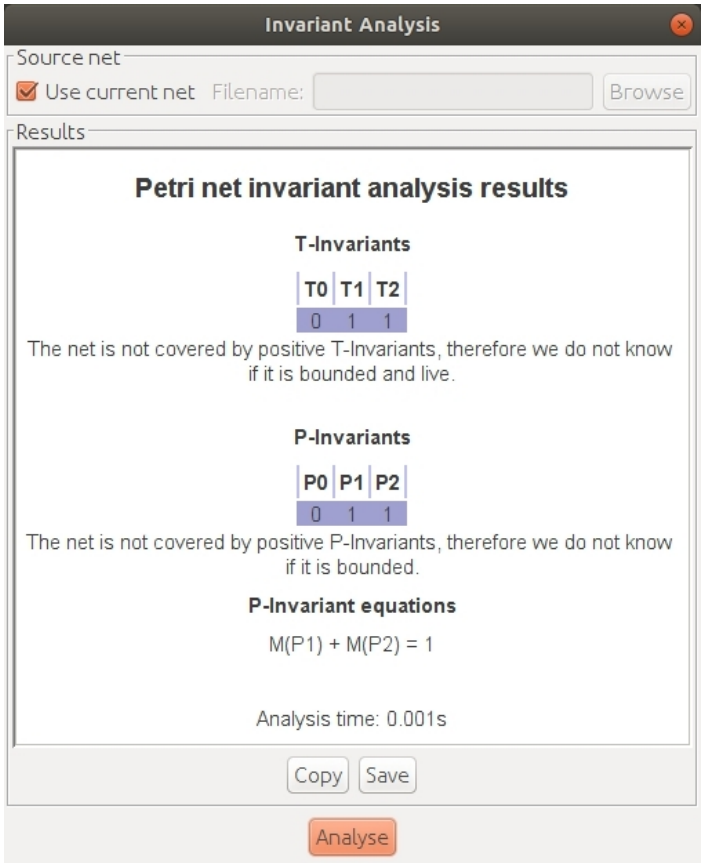
- Enabled transitions are highlighted with red color
- Simulation modes:
  - manually fire a transition by clicking on it
  - randomly fire a transition
  - fire a given number of transitions



Analysis I

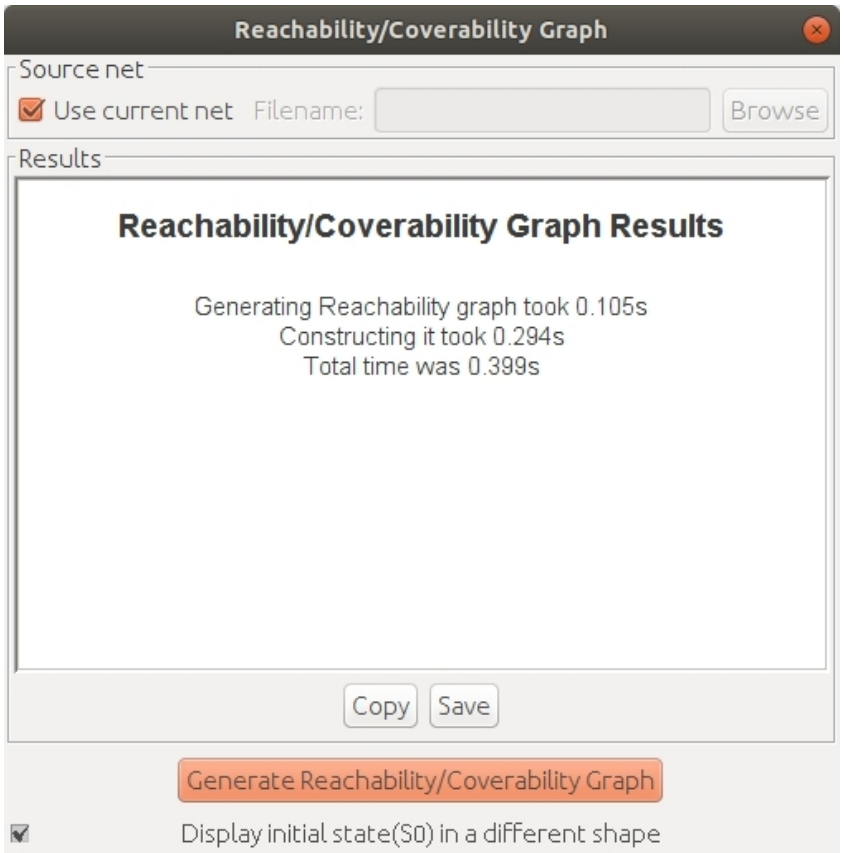
Consider the example on the previous slide:

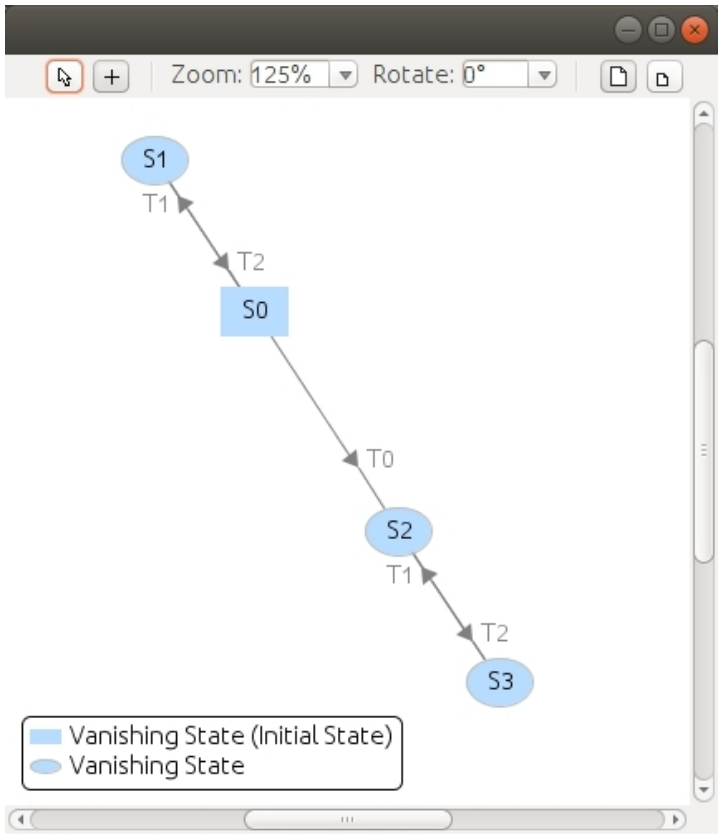
- Invariants



Analysis II

- Reachability graph

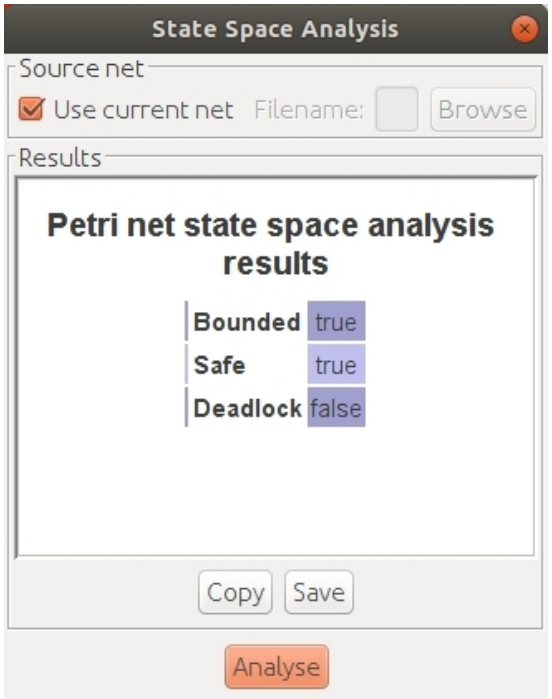




Marking corresponds to {P0, P1, P2}
Hover mouse over nodes to view state marking

Analysis III

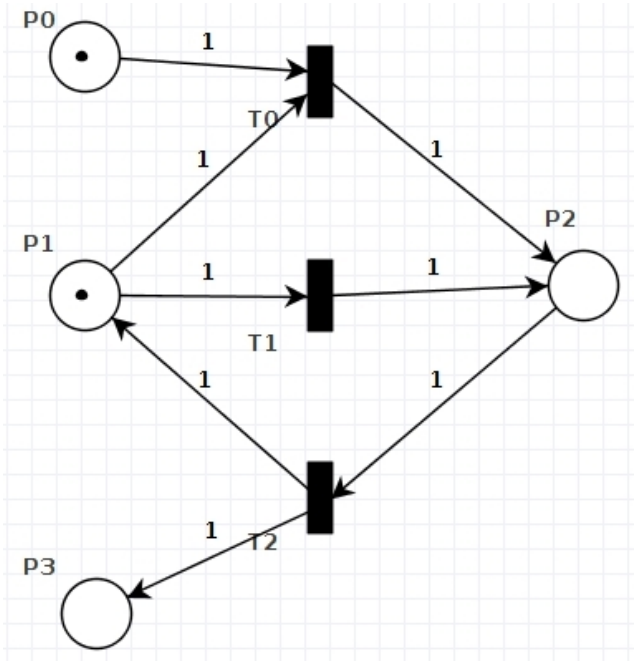
- State space analysis



- Conservativity? Liveness?

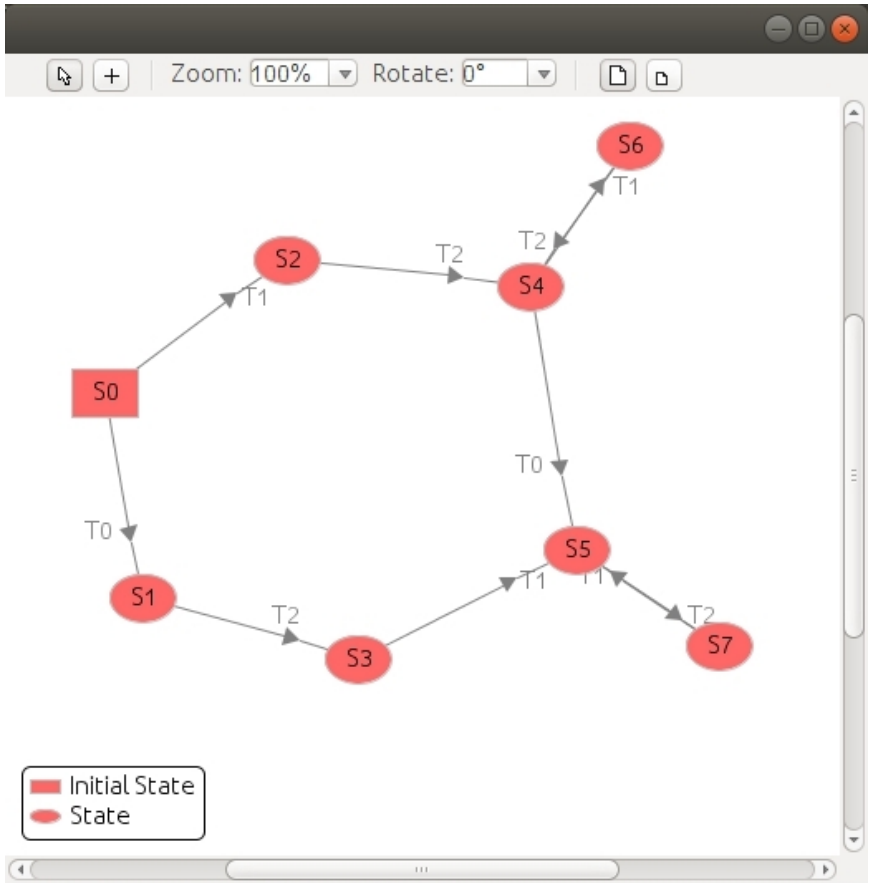
Bugs... I

Consider the following unbounded net:



- Generate the reachability/coverability graph

Bugs... II



- Hover the mouse over the nodes. The unbouded places have large number of tokens at the beginning...

Task

- Construct the Petri net of the coffee automaton, given in the tutorials. Take care of the place capacities!
- Simulate the model! Try different initial markings!
- Analyse the model (boundedness, safety, deadlock, reachability graph)