

Parsybone manual

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April 10, 2012

1 Model specification

Model is contained within the MODEL tag.
All numerical values can be integers only.

1.1 Example

```
<MODEL>
  <STRUCTURE unspec="error">
    <SPECIE name="SampleOne" max="1" basal="1">
      <INTERACTIONS>
        <INTER source="1" threshold ="1" />
      </INTERACTIONS>
      <REGULATIONS>
        <REGUL mask="0" t_value="-1" />
        <REGUL mask="1" t_value="-1" />
      </REGULATIONS>
    </SPECIE>
    <SPECIE name="SampleTwo" max="1" basal="0">
      <INTERACTIONS>
        <INTER source="0" threshold ="1" />
      </INTERACTIONS>
      <REGULATIONS>
        <REGUL mask="0" t_value="-1" />
        <REGUL mask="1" t_value="-1" />
      </REGULATIONS>
    </SPECIE>
  </STRUCTURE>
</MODEL>
```

```

</STRUCTURE>
<AUTOMATON>
  <STATE final="0">
    <TRANSITIONS>
      <TRANS label="SampleOne=1" target="1" />
      <TRANS label="SampleOne=0" target="0" />
    </TRANSITIONS>
  </STATE>
  <STATE final="1">
    <TRANSITIONS>
      <TRANS label="SampleOne=1" target="2" />
      <TRANS label="SampleOne=0" target="0" />
    </TRANSITIONS>
  </STATE>
  <STATE final="0">
    <TRANSITIONS>
      <TRANS label="SampleOne=1" target="2" />
      <TRANS label="SampleOne=0" target="1" />
    </TRANSITIONS>
  </STATE>
</AUTOMATON>
</MODEL>

```

1.2 Description of model

Model is described within STRUCTURE tag.

1.2.1 STRUCTURE

unspec Currently unused, supposed do delimit handling of unspecified regulations.

STRUCTURE holds SPECIES

1.2.2 SPECIE

name Name of the specie, currently used for a reference in Büchi automaton.

max Maximal value the specie can have. Minimal is always zero.

SPECIE holds container of INTERACTIONS and container of REGULATIONS.

1.2.3 INTER

source Index of the specie (numbered from zero) the is a source of the interaction.

threshold Lowest value of the source specie that activates this interaction.

1.2.4 REGUL

mask Boolean mask over all incoming interactions (1 for active, 0 for non-active)

t.value Target value for given regulatory context - must be a value the state can occur in or -1, meaning this value is a parameter.

Currently all regulations (exponentially many w.r.t. incoming interactions) must be explicitly specified.

1.3 Description of property

Property is described within AUTOMATON tag using the Büchi automaton.

1.3.1 AUTOMATON

AUTOMATON holds STATES

1.3.2 STATE

final 1 if the state is final, 0 otherwise

STATE holds container of TRANSITIONS.

1.3.3 TRANS

label Atomic propositions or dual clause of atomic propositions or *tt* for always true. Each AP is in the form: SpecieName*Value where Value is an integer and * is one of <, =, >. AP can also be a negation of previous written !AP.

target Index of a state (indexed from 0) that is reachable if the property is true.

1.3.4 Creating Büchi automaton

It is important to keep in mind that Büchi automata (BA) are non-deterministic. To create BA for a time serie (TS), create a sequence of states that contain two transitions:

- One with label tt to itself.
- One leading to next state with label that requests all the species to have values requested by the TS.

Last state is only required to have a transition by parse, it can be anything and lead anywhere..., I use tt to itself.

To achive monotonicity, it is necessary to put other states between those for two measuerements that are reached when value, that is required to be monotene changes and the state has transition to itself only if that value does not change its value other way around.