

# Parsybone manual

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## 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.

**label** + or - or empty. This attribute is not mandatory.

**observ** 1 if the edge is requested to be observable, 0 otherwise

### 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.