PAL Model Rules for Parser

PAL model must contain the following components and in this order:

Initial Reset Parameters

These are needed to reset Bio-PEPA organism internal species to their initial values when the organism is off so the organism can be reused. InitialReset must be given before the internal species id to identify this is an initial reset parameter. The parser identifies if a species needs to be added to or deleted from by where the speices id is placed in the Heaviside function expression. For example LA (on the right of the minus) will be identified as needing added to whereas LB (on the left of the minus) will need deleted from. The parser will create parameters, action rates and actions based on these parameters.

InitialReset LA = H(100 - LA);
InitialReset LB = H(LB - 50);

Parameters

Each parameter must have an id. A parameters expression can contain internal species. Parameters that contain internal species are specific to an organism so these will multiplied and given appropriate ids based on the organism. Other constant parameters will be left the same. The parser gathers information here about what parameters are associated to what organism.

Example:
Constant
DeathRate = 0.005;
Contains internal species
Produce = H(JA -AThreshold);

Action Rates

Each action rate must have an id. Action rate expressions can contain internal species and parameters. *Note actions with the id ‘empty’ are treated as a special action rate which does not times the organisms on agent with this actions rate.

Example:
AddA : 0.5;
ProduceLarva : fMA(100*Produce);

Internal Species

All internal species must have an id. The parser gathers information here about what actions occur in what organisms.

Example:
LA = (AddA,1) >> + (RemoveA,1) <<;
JA = (RemoveB,1) >> +(EmptyA,1) <<;

HiddinActions set

Must have two IDs: list of actions in curly brackets. The parser removes this from the Bio-PEPA model.

Example:
HiddenActions A : {AddA,RemoveA,AddB,RemoveB,StopProduceLarva,EmptyA};

Organism Components

All organism components must have an ID. The parser gathers information here about what species are associated with a specific organism.

Example:
Larva = LA[100] <*> LB[50] <*> SwitchOn[0] <*> SwitchOff[1]
Juvenile = JA[50] <*> JB[200] <*> TrackerOn[0] <*> TrackerOff[1]

(Optional) Population Action Rates
Each action rate must have an ID. These will be treated the same as the action rates.
Example:
PopDie : PopDeathRate;
PopAdd : PopAddRate;

Population Components Actions
A population ID must be ID{{Organism ID}}. These components are used by the parser to create the on and off agents of the Bio-PEPA model.
Example:
Larvae{{Larva}} = Switch <<< + ProduceLarva >>> + Die <<< + PopDie <<< + PopAdd >>>;
Juveniles{{Juvenile}} = Switch >>> + ProduceLarva ((+)) ;

Model Component
Initial value of organisms in a population must be in double square brackets. Initial values should be less than or equal to max values.
Example:
Larvae{{Larva}}[[1]]{Switch,ProduceLarva}Juveniles{{Juvenile}}[[0]]

Max Statement (How many organisms maximum can there be in a population?) Max values should be more than or equal to initial values.
Max: PopID maxvalue, PopID maxvalue;
Example:
Max: Larvae{{Larva}} 20, Juveniles{{Juvenile}} 30;