Model Checking with Maria

Load the net description to Maria with command `maria -m net.pn`
The command will not perform reachability analysis to the net. It will only load the net description. The net description can also be loaded in Maria with command `@0$model "net"`

Maria uses a separate program to translate LTL formulae to Büchi automata. Before the formula can be checked, Maria must be told the used translator with command `@0$translator "lbt"`
Lbt is here the name of the used translator. The argument of the command `translator` is the name of the translator executable. The translator can also be loaded with the command line option `-p "lbt"`.

When the net description and the LTL-Büchi translator have been loaded, the LTL formulae can be checked by writing the formula at the Maria prompt, for example: `@0$[]<>(2 subset place P)`
Maria will then perform on-the-fly model checking, generating only the part of the reachability graph needed for generating the counterexample. If no counterexample is found, the whole reachability graph will be generated. By adding a command `visual` in front of the formula, the possible counterexample will be displayed graphically.

The formulae to be checked are:

1. $\Box\neg(\text{critical}(1) \wedge \text{critical}(2))$
2. $\Box\neg\text{critical}(1)$
3. $\Box\Diamond\text{cririical}(1)$
4. $\Box(\text{critical}(2) \rightarrow \Diamond\text{idle}(2))$

Fairness Assumptions

Fairness assumptions are used to filter out such counterexamples, which are not fair executions. There is more information about fairness in the lecture slides, pp. 5-24–5-26.

By using commands `weakly_fair` and `strongly_fair` in the net description, one can efficiently define transitions or groups of transitions that should behave fairly. The command `weakly_fair` corresponds to the fairness assumption $\Diamond\Box e \rightarrow \Box\Diamond f$ and `strongly_fair` the assumption $\Box\Diamond e \rightarrow \Box\Diamond f$. If a fairness assumption is defined for a group of transitions, it requires that if one transition of the group is enabled infinitely or infinitely often, some of the transitions of the group must be fired.

The needed fairness assumptions are defined in the file `ticket.pn`. They can be taken in the use with command line option -DFAIR when starting Maria.