Formal Models SS 2020: Assignment 5

Based on Video "Lecture 03. April 2014" on our webpage.
Institute for Formal Models and Verification, JKU Linz

due 30.04.2020

Guideline:

- To indicate that you solved an exercise, tick it off in our MOODLE course until the following deadline:

  10am on the day when the exercises due (10am 23.04.2020)

  Unmarking and marking exercises later is **not** possible.

- Upload your solved exercises in the Moodle course.

  Generate a single PDF file with all solved exercises, your name, and your matriculation number.

  Not following this format will lead to the deduction of points!

- We will randomly select and correct solved exercises and provide a sample solution.

Exercise 17

Draw the LTS for PA system for P, with $P = Q \,||\, R \,||\, S \,||\, T$, $Q = a.b.Q$, $R = b.c.R$, $S = d.c.S$, $T = a.c.T$

Exercise 18

Given the the PA system $P = Q \,||\, R$, with $Q = a.s.Q + b.s.Q$, and $R = s.R + s.c.R$. Draw the LTS defined by P. Further show that action $((s.Q + a.s.Q) \,||\, R) + (s.Q \,||\, (c.s.R + s.R)) \xrightarrow{s} Q \,||\, R$ can be executed by subsequently applying the semantical rules of PA.

Exercise 19

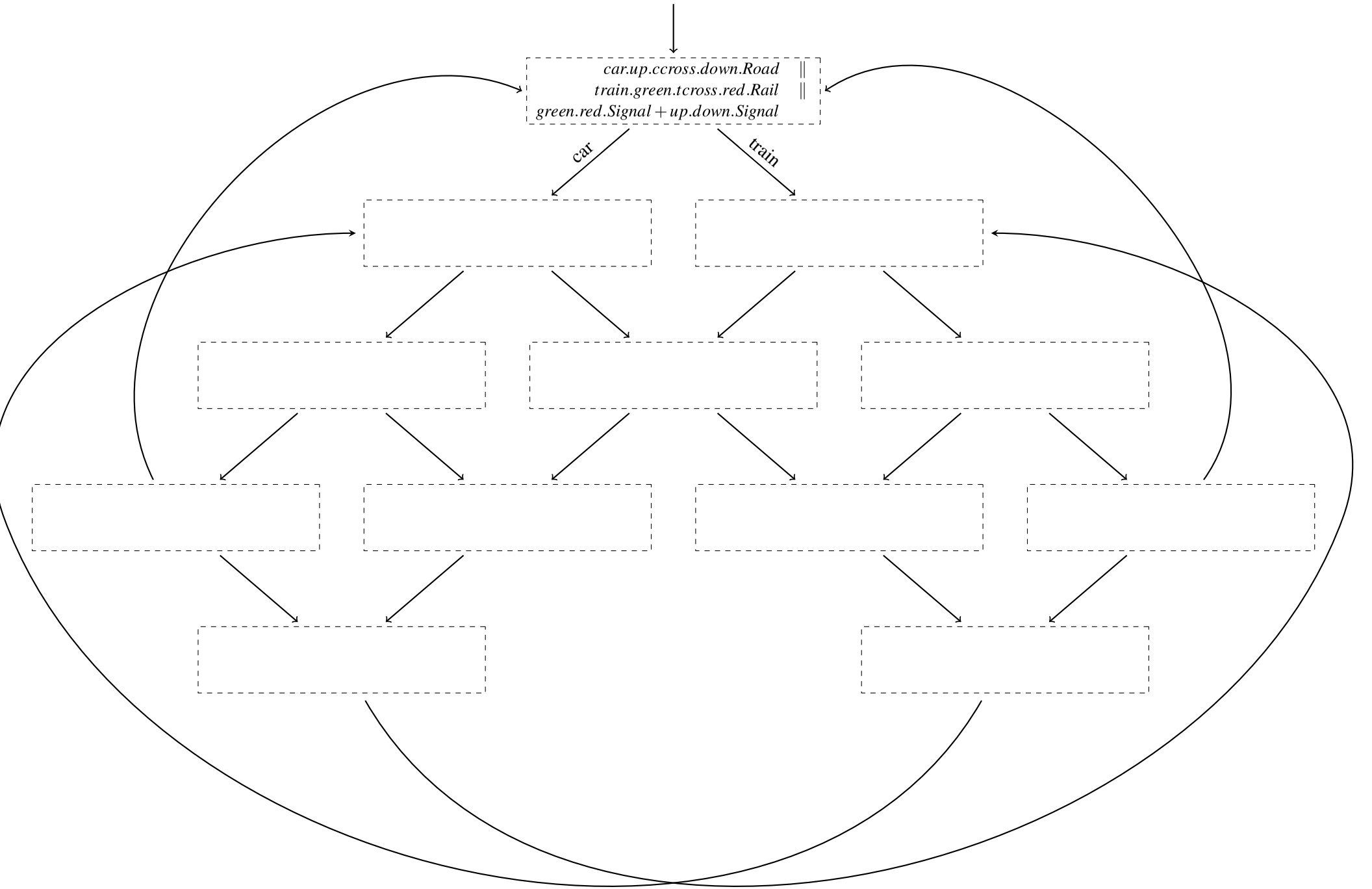
Draw the LTS for the model of the railroad crossing presented in the lecture (slide 28, without hiding). As a help, on the next page you can find the shape of the expected LTS including the first steps. Fill out the nodes and transition labels of the system. Further, find out whether accidents can happen in the model or not, and justify your answer.

Exercise 20

Let $\oplus$ denote an alternative PA-operator for non-deterministic choice. The semantics of $\oplus$ are defined as follows:

$$R^1_\oplus: \quad \frac{P \xrightarrow{a} P'}{(P \oplus Q) \xrightarrow{a} (P' \oplus Q)} \qquad R^2_\oplus: \quad \frac{Q \xrightarrow{a} Q'}{(P \oplus Q) \xrightarrow{a} (P \oplus Q')}$$

Assume that $+$ is replaced by $\oplus$ in the model of the railroad crossing from the previous exercise. Under this assumption, find the shortest possible sequence of transitions which yields a state where an accident can happen. You do not have to draw all states but only those which are needed for the solution of this exercise.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