Formal Models SS 2018: Assignment 6

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Due 03.05.2018

To indicate that you solved an exercise and that you can present it in the exercise group, tick it off in our MOODLE course until **8am on the day of the exercise**. Unmarking and marking exercises at the begin of the exercise class is **not** possible.

Exercise 21

- Let P, Q and R be PA systems with $P = a.t.P, Q = b.t.Q$ and $R = t.R$.
  1. Draw the LTS for $P \mid\mid Q \mid\mid R$.
  2. Draw the LTS for $(P \mid\mid Q)\backslash\Theta \mid\mid R$, where $\Theta = \{t\}$ is the hiding alphabet.
- Show that action $(a.b.Q + b.a.Q) \mid\mid (d.c.R + c.d.b.R) \xrightarrow{a} b.Q$ can be executed by subsequently applying the semantical rules of PA.

Exercise 22

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 discussed in the lecture. 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.

Exercise 23

Draw the LTS for the *correct* version of Milner's Scheduler (slide 33) for $n = 2$.

Exercise 24

Given a CEN $N = (C, I, E, G)$ with $C = \{r, s, t, u\}$, $I = \{r, s\}$, $E = \{b, c, d, e\}$,
$G = \{(r,b), (r,c), (s,c), (t,e), (u,d), (e,u), (c,t), (c,u), (b,s), (d,r)\}$

- Draw the CEN N.
- How many markings (how many states) are possible on N *theoretically*?