Formal Models SS 2012: Assignment 5

Institute for Formal Models and Verification, JKU Linz

Due 26.04.2012

Exercise 17

Let $P = Q \,||_\Theta\, R$ where Q and R are defined as in Exercise 15: $Q = a.b.t.Q$, $R = d.t.R + c.R$. Let $\Sigma = \Sigma(P) = \Sigma(Q) \cup \Sigma(R) = \{a,b,c,d,t\}$. Draw the LTS for $P = Q \,||_\Theta\, R$ where...

1. ... $\Theta = \{b,t\} \subseteq \Sigma$.
2. ... $\Theta = \{b,c\} \subseteq \Sigma$.

Exercise 18

Draw the LTS for the model of the railroad crossing presented in the lecture (slide 28). Find out whether accidents can happen in the model or not, and justify your answer.

Exercise 19

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 Exercise 18. 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 20

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