TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Computer Science Institute of Theoretical Computer Science, Chair of Automata Theory

Automata and Logic

Exercise Sheet 13

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Exercise 61

Let $\Sigma = \{a, b\}$ and $\mathcal{A}$ be the Rabin-automaton $\mathcal{A} = (\{q_0, q_1, q_2\}, \Sigma, \{q_2\}, \Delta, \{(\{q_0, q_2\}, \{q_1\})\})$ where:

$$\begin{aligned} \Delta_a\colon\ q_0 &\mapsto \{(q_1, q_1)\} & \qquad \Delta_b\colon\ q_0 &\mapsto \{(q_0, q_0)\} \\ q_1 &\mapsto \{(q_1, q_1)\} & q_1 &\mapsto \{(q_0, q_0)\} \\ q_2 &\mapsto \{(q_0, q_1)\} & q_2 &\mapsto \{(q_0, q_1)\} \end{aligned}$$

Use the method from the proof of Prop. 7.12 from the lecture to decide whether $L_\omega(\mathcal{A}) = \emptyset$ or not.

Exercise 62

Let $\Sigma = \{0, 1\}$ and

$$L = \{t \in \mathbf{T}^\omega_\Sigma \mid \text{for every path } p\text{, if } p \text{ contains the symbol 0, then } p \text{ contains the symbol 1 only finitely often.}\}.$$

Give an S2S-formula ϕ such that $L_\omega(\phi) = L$.

Exercise 63

For the automaton $\mathcal{A}$ from Exercise 61, give an S2S-formula ϕ with $L_\omega(\mathcal{A}) = L_\omega(\phi)$.