TECHNISCHE UNIVERSITÄT DRESDEN

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

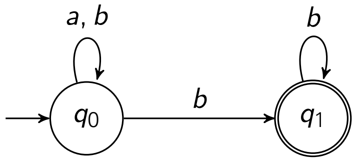
Automata and Logic

Exercise Sheet 9

Dr. rer. nat. Daniel Borchmann / Dipl.-Math. Francesco Kriegel
Summer Semester 2015

Exercise 48

Let $\Sigma := \{a, b\}$, and $L \subseteq \Sigma^\omega$ be the ω-language recognised by the following Büchi automaton:



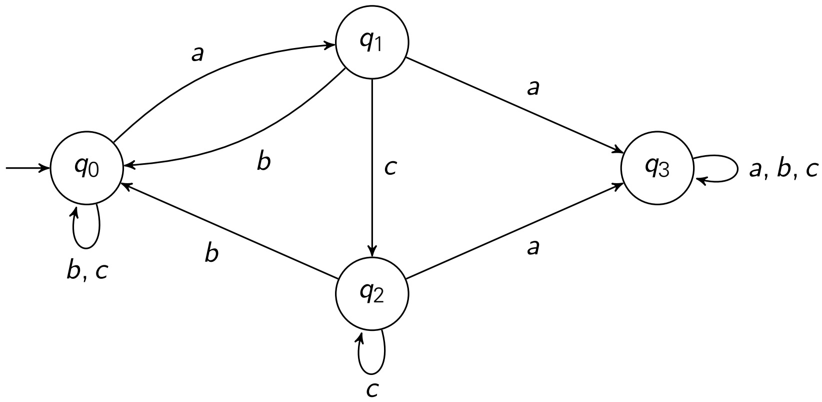
Use the method presented in the lecture to construct a Büchi automaton that recognises the language $\Sigma^\omega \setminus L$.

Exercise 49

Prove that for every ω-regular language L, there is a Büchi automaton $\mathcal{A}$ with $L_\omega(\mathcal{A}) = L$ such that from every state q of $\mathcal{A}$, there are *at most two* transitions using the same alphabet symbol.

Exercise 50

Let $\Sigma := \{a, b, c\}$. Consider the following transition system:



We derive four Muller automata $\mathcal{A}_1$, $\mathcal{A}_2$, $\mathcal{A}_3$, and $\mathcal{A}_4$ by selecting the sets of final states $\mathcal{F}_1$, $\mathcal{F}_2$, $\mathcal{F}_3$, and $\mathcal{F}_4$ as follows:

a) $\mathcal{F}_1 := \{\{q_0, q_3\}, \{q_3\}\}$;

b) $\mathcal{F}_2 := \{\{q_0, q_1\}, \{q_2\}\}$;

c) $\mathcal{F}_3 := \{\{q_0, q_1, q_2\}\}$; and

d) $\mathcal{F}_4 := \{\{q_0\}, \{q_0, q_1\}, \{q_2\}, \{q_0, q_1, q_2\}\}$.

Determine the ω-languages $L_\omega(\mathcal{A}_1)$, $L_\omega(\mathcal{A}_2)$, $L_\omega(\mathcal{A}_3)$, and $L_\omega(\mathcal{A}_4)$.