Formal Models SS 2020: Assignment 3

Based on Video "Lecture 20. March 2014" on our webpage.

Institute for Formal Models and Verification, JKU Linz

Due 02.04.2020

Guideline:

- To indicate that you solved an exercise, tick it off in our MOODLE course until **10am on the day of the exercise (Due 02.04.2020)**. Unmarking and marking exercises later is **not** possible.

- **Upload your solved exercises in the Moodle course. Generate a single PDF file, which contains all solved exercises, your name, and your matriculation number. Upload the PDF file - do not generate a ZIP!** Not following the format leads to deduction of points!

- We will randomly select and correct solved exercises.

- A sample solution will be provided.

Exercise 9

Draw a *deterministic* FA A with $\Sigma := \{a, b\}$ having *at least* 3 states such that $L(C(A)) \neq \overline{L(A)}$, where $C(A)$ denotes the complement-automaton of A. Explain your solution.

Exercise 10

Given FA *A* where $\Sigma := \{a,b\}$ as shown on the right. Draw the oracle-automaton *Oracle(A)* as defined on lecture slide 8. For making *Oracle(A)* complete by introducing an error state, how many new transitions have to be added?
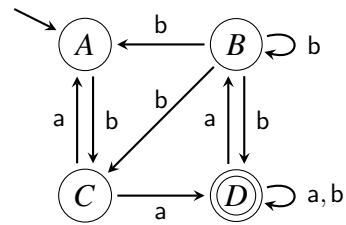
Exercise 11

Given FA *A* from the previous exercise, draw the *optimized* oracle-automaton *Oracle(A)*. Is *Oracle(A)* complete? Is it deterministic? Justify your answer.

Exercise 12

Draw an I/O-automaton modelling the digital circuit shown on the right. Use $\Sigma := \Theta := \{0,1\}$ as input- and output-alphabet. Assume that both D-flip-flops start with $Q = 0$.