Prof. Dr. Andreas Podelski
Dominik Klumpp
Frank Schüssele

Hand in until January 20th, 2021
23:59 via ILIAS
Discussion: January 25th/26th, 2021

Tutorial for Cyber-Physical Systems - Discrete Models
Exercise Sheet 9

Exercise 1: Linear-Time Properties I — 7.5 Points

The goal of this exercise is to construct transition systems for given properties.

Assume $AP = \{a, b\}$. For each of the properties P_i, complete the following tasks:

(a) Formalize P_i as a set of traces using set comprehension.
For example: "always a" can be formalized as $\{A_0A_1A_2 \cdots \mid \forall i.\, a \in A_i\}$.

(b) If possible, draw a transition system (with at least 2 traces) that satisfies P_i.

(c) If possible, draw a transition system (with at least 2 traces) that does not satisfy P_i.

(P_1) True

(P_2) False

(P_3) There are at most 2 points of time, where a holds.

(P_4) There are infinitely many points of time, where b holds.

(P_5) Whenever a holds, b holds in the next step.

Exercise 2: Linear-Time Properties II — 5 Points

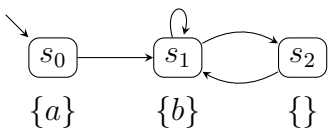
The goal of this exercise is to find properties for given transition systems.

Assume $AP = \{a, b\}$. For each of the transition system T_i, complete the following tasks:

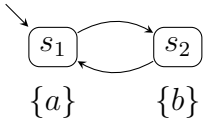
(a) Give a property (different from "True") using set comprehension that is satisfied by T_i. Do not use any property more than once.

(b) Give a property (different from "False") using set comprehension that is not satisfied by T_i. Do not use any property more than once.

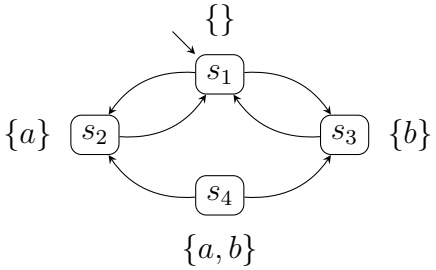
(T_1)



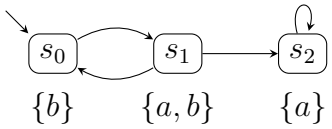
(T_2)



(T_3)



(T_4)



(T_5)