technische universität dortmund

fakultät für informatik

CS 12 computer science 12

lea.schoenberger [☺] tu-dortmund.de
christian.erdmann [☺] tu-dortmund.de
nils.hoelscher [☺] tu-dortmund.de
jan.pham [☺] tu-dortmund.de

Exercise Sheet 2 (Theory)
(11 Points)

Please note: Solutions must be submitted (individually or in pairs) until 18.10.2019 at 10:00 AM (mailbox in OH16, ground floor, in front of room E16). Submitting solutions via mail is *not* possible. Discussion: 21.-25.10.2019.

1 Specification and Modeling Languages (2 Points)

Name two requirements for specification and modeling languages for embedded systems.

2 StateCharts (3 Points)

Mr. Smart invented a machine for baking chocolate cookies. The machine has three different buttons: One for switching it on and off (on/off), one for specifying the size of the cookies *(S)*, and one for configuring the cookie crunchiness *(C)*.

Cookies baked with the machine can be either big or small (standard configuration) and either soft, crunchy or very crunchy (standard configuration). By pressing the button *S*, the size configuration is changed (possible changes: from small to big, from big to small) and by pressing the button *C*, the crunchiness is modified (possible changes: from very crunchy to soft, from soft to crunchy, from crunchy to very crunchy).

When the machine is turned off and on again, the last crunchiness configuration is restored.

Model the behavior of the machine as a StateChart!

3 SDF (2 Points)

Suppose that the following SDF model is given:
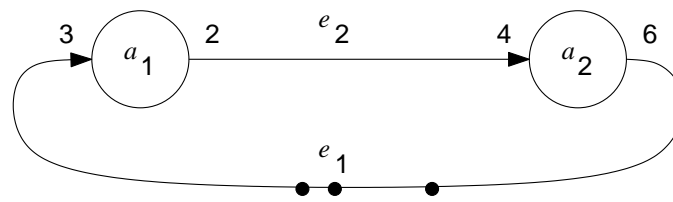
Suppose that SDF actors execute in 1 unit of time. Generate a possible execution schedule, assuming a single execution unit (no parallel execution) and an initial set of 6 tokens for edge e_1:

Time	Tokens on edges		Next actor execution
	e_1	e_2	a_1 or a_2
0	6	0	
1			
2			
3			
4			

Now, assume an initial set of 9 tokens for edge e_1. Provide an example of parallel execution, i.e., an example for which both actors are active. Enter the names of the concurrently executing actors into the right column!

Time	Tokens on edges		Next actor execution(s)
	e_1	e_2	a_1, a_2 or (a_1 and a_2)
0	9	0	
1			
2			
3			
4			

4   SDF vs. KPN (4 Points)

Mr. Smart decided to migrate his model of an embedded system from synchronous data flow (SDF) to Kahn process networks (KPN). What may be the reason(s)? After completely his model, Mr. Smart cannot fully verify it. Please explain shortly, what can be the reason(s).