

HOMWORK FOR LECTURE  
AUTOMATA AND FORMAL LANGUAGES II

TU MÜNCHEN  
INSTITUT FÜR INFORMATIK

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HOMWORK SHEET 11

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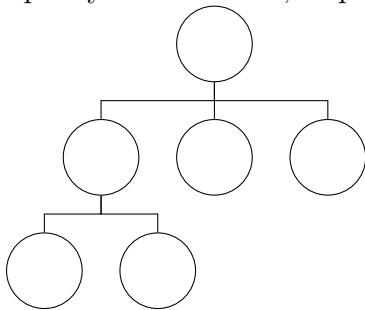
**Aufgabe 11.1.** [DPNs]

(10 points)

1. Specify a DPN for the example program from slide 112:

```
void p () {  
    if (...) {  
        spawn p;  
        p();  
    }  
}  
  
main () {  
    p();  
}
```

2. Specify an execution, step by step<sup>1</sup>, that reaches a configuration of the following shape:



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<sup>1</sup>Specify the initial, intermediate, and final configurations, and the rules used.

**Aufgabe 11.2.** [Context Independence]

(10 points)

The execution of a thread in a DPN does not depend on its context. In particular, we can embed a given execution into a larger context. Let  $M = (P, \Gamma, \text{Act}, p_0, \gamma_0, \Delta)$  be a DPN,  $c, c' \in \text{conf}$  be configurations.

1. Let  $C$  be a context with exactly one occurrence of  $x_1$ . Show

$$c \xrightarrow{l}^* c' \implies C[c] \xrightarrow{l}^* C[c']$$

2. Now let  $C$  be a context that contains  $x_1$  exactly  $n$  times.

- a) Give an example that the above statement does not hold any more.
- b) Show

$$c \xrightarrow{l}^* c' \implies C[c] \xrightarrow{l^n}^* C[c']$$

Where  $l^n := \underbrace{l \cdot l \cdot \dots \cdot l}_{n \text{ times}}$  is the  $n$ -fold repetition of the sequence  $l$ . Hint: Construct the execution for each position of  $x_1$  in  $C$  separately. For this, you may want to re-phrase the result from 1) to positions.