Universität Koblenz-Landau

FB 4 Informatik

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30 January 2019

Exercises for "Formal Specification and Verification"
Exercise sheet 13

Exercise 13.1:
Use the sequent calculus presented in the lecture to prove:

$$[\alpha^*]F \vee [\alpha;\alpha]G \Rightarrow F \vee [\alpha][\alpha]G$$

Exercise 13.2:
Consider the following program:

```
1: if (y > 0) then skip else halt;
2: x := 2*y;
3: z := y;
4: if (x <= z) then goto 6;
5: exit
6: error
```

(1) Describe the formulae for:
   - initiation condition $Init$
   - Error condition ϕ_{err}
   - The single statement transition relations in $\mathcal{R}$
   - The program transition relation $\rho_{\mathcal{R}}$

(2) Compute $post^i(Init, \rho_{\mathcal{R}})$ for $i = 1, 2, 3, 4, 5, 6$.
Can you determine a natural number n with $\bigvee_{i=0}^{n} post^i(Init, \rho_{\mathcal{R}}) = \bigvee_{i=0}^{n+1} post^i(Init, \rho_{\mathcal{R}})$?

(3) Use the results in (2) to characterize ϕ_{reach}.

(4) Show that no error state is reachable from the initial state.

You can send me your solution by e-mail before Sunday, 3.02.2019 at 20:00.