

Language Based Security

Winter Semester 2008

Exercise sheet 7.

21 Jan 2009

Exercise 1:

Consider the following code discussed in the lecture.

```
prod : r3 := 0;  
      jump loop  
loop : if r1 jump done;  
      r3 := r2 + r3;  
      r1 := r1 + -1;  
      jump loop  
done : jump r4  
halt : jump halt
```

We use the heap type Ψ defined as below.

$$\Gamma_1 = \{r1 : \text{Top}, r2 : \text{Top}, r3 : \text{Top}, r4 : \text{Top}\}$$
$$\Gamma_2 = \{r1 : \text{Top}, r2 : \text{Top}, r3 : \text{Top}, r4 : \text{Code}(\Gamma_1)\}$$
$$\Gamma_3 = \{r1 : \text{Int}, r2 : \text{Int}, r3 : \text{Int}, r4 : \text{Code}(\Gamma_1)\}$$
$$\Psi = \{\text{prod} : \text{Code}(\Gamma_3), \text{loop} : \text{Code}(\Gamma_3), \text{done} : \text{Code}(\Gamma_2), \text{halt} : \text{Code}(\Gamma_1)\}$$

Show that each of the instruction sequences is well-typed under the heap type Ψ .