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Virtual Machines

Summer Semester 2007

Exercise sheet 6 *Deadline: 29 May 2007 12:00*

Exercise 1: *10 Points*

Consider the following Call-By-Value generated code for a PuF expression.

```
   alloc 1
   pushloc 0
   mkvec 1
   mkfunval _0
   jump _1
_0:targ 2
   pushloc 0
   getbasic
   pushloc 2
   getbasic
   gr
   jumpz _2
   mark _4
   pushloc 3
   getbasic
   pushloc 5
   getbasic
   sub
      mkbasic
      pushloc 5
      pushglob 0
      apply
   _4:jump _3
   _2:pushloc 0
      getbasic
      pushloc 2
      getbasic
      le
      jumpz _5
      mark _7
      pushloc 4
      getbasic
      pushloc 4
      getbasic
      sub
      mkbasic
         pushloc 4
         pushglob 0
         apply
      _7:jump _6
      _5:pushloc 0
      _6:
      _3:return 2
      _1:rewrite 1
         mark _8
         loadc 6
         mkbasic
         loadc 4
         mkbasic
         pushloc 5
         apply
      _8:slide 1
         halt
```

a) Determine the stack distance sd for every program point (initially $sd = 0$).

b) What does this program compute ?

Exercise 2: *3+7 Points*

Generate code for the following expressions

a)
```
let x = 5 + 5 in x * x
```
using CBN with $\rho = \emptyset$ and $sd = 0$.

b)
```
letrec
fib = fn x => if x <= 1 then 1 else (fib (x-1)) + (fib (x-2))
in fib 4
```
using CBV with $\rho = \emptyset$ and $sd = 0$.