
Concepts of Programming Languages

<http://proglang.informatik.uni-freiburg.de/teaching/konzepte/2009ss/>

Exercise Sheet 4

2009-05-14

Hints:

- When requested to modify or extend a language from the EOPL (“Essentials of Programming Languages”) book, you should always extend the original code (available from the EOPL homepage <http://www.eopl3.com/code.html>). Please mark your changes clearly!
- The code from the EOPL book comes with an extensive test suite. When modifying code, you must adapt this test suite and extend it with your own tests!
- The SLLGEN parsing system (used by code from the EOPL book) is explained in Appendix B of the book.

Exercise 1 (8 points)

Extend the LETREC language from the EOPL book with the following features:

- `letrec`-bound procedures should support an arbitrary number of arguments instead of just one. Consequently, it must be possible to call procedures with an arbitrary number of arguments.
- The `letrec` construct should allow the declaration of any number of mutually recursive procedures.

Here is the relevant part of the grammar for the extended language:

$$\begin{aligned} \textit{Expression} & ::= \textit{letrec} \{ \textit{Identifier} (\{ \textit{Identifier} \}^*) = \textit{Expression} \}^* \textit{in} \textit{Expression} \\ \textit{Expression} & ::= (\textit{Expression} \{ \textit{Expression} \}^*) \end{aligned}$$
Exercise 2 (8 points)

Rewrite the interpreter for the EXPLICIT-REFS language from the EOPL book such that it avoids the global variable `the-store` and all effectful operations such as `set!`. Instead, you should pass around the store as a parameter. Procedures that are intended to modify the store must return the modified store instead of changing it in-place. (If such procedures should also return some other value, you should package this other value together with the store in a pair.)

Submission

Via email to wehr@informatik.uni-freiburg.de. Please submit in pairs of two. Your code must not raise errors when pressing DrScheme’s “Run” button.

Please adhere to the following conventions:

- If your submission consists of a single scheme file, the name of this file should be $name_1-name_2-exn.scm$ where $name_1$ and $name_2$ are your names and n is the number of the sheet.
- If your submission consists of several file, you must place them into a `.zip` or `.tar.gz` archive. The name of this archive should be $name_1-name_2-exn.zip$ (replace `.zip` with `.tar.gz` if you are submitting a `.tar.gz` file), where $name_1$ and $name_2$ are your names and n is the number of the sheet. Inside the archive, there must be a single directory of name $name_1-name_2-exn$ ($name_1$, $name_2$, and n as before). This directory should then contain your actual submission files. **Do not place your submission files at the top-level of the archive!**

The strict submission deadline is **2009-05-21, 1 pm.**