Programming Languages (COP 4020/CIS 6930) [Fall 2014]

Assignment VII

Objectives
1. To gain experience setting up deductive systems.
2. To formalize static and dynamic semantics for a new programming language.

Due Date: Tuesday, October 28, 2014 (at the beginning of class, 5:00pm).

Assignment Description
Do the following by yourself.

Recall the following language L from Assignment V:

\[
\text{types } \tau ::= \text{bool } | \tau_1 \times \tau_2
\]

\[
\text{exprs } e ::= x | \text{true } | \text{false } | e_1 \text{ NOR } e_2 | (e_1,e_2) | \text{let val } (x_1,x_2) = e_1 \text{ in } e_2 \text{ end}
\]

This language contains variables (x), true and false literals, logical-NOR expressions, binary tuples, and let-expressions. Let-expressions in L have the same meaning as in ML, except that L’s let-expressions always declare a pair of variables.

Define static and dynamic semantics for L. Assume that all variable names in all expressions under consideration have been made unique through alpha-conversion; hence, you never have to consider contexts containing more than one entry for the same variable. Also, assume that capture-avoiding substitution ([e/x]e’) is already defined for L, so you can just use that notation ([e/x]e’) without defining it.

As always, avoid making the definitions significantly more complicated than necessary. If you get stuck at any point, please explain in prose whatever you’re having trouble formalizing.

Submission Notes
- Turn in a hardcopy (handwritten or printed) version of your solutions. Please do not email solutions or upload them into Canvas.
- Write the following pledge at the end of your submission: “I pledge my Honor that I have not cheated, and will not cheat, on this assignment.” Sign your name after the pledge. Not including this pledge will lower your grade 50%.
- You may submit solutions up to 2 days late with a 15% penalty.
- If you think there’s a chance you’ll be absent or late for class on the date this assignment is due, you are welcome to submit solutions early by giving them to me or a TA before or after class, or during any of our office hours.