CS558 Programming Languages – Fall 2023 – Study Questions Lecture 4a

These questions are intended for self-study, to help review and deepen your understanding of the lecture. Sample answers are available. There is nothing to hand in.

1. Consider the definitions on slide 5.
Suppose $E = \{\texttt{a} \mapsto L_1, \texttt{b} \mapsto L_2\}$ and $S = \{L_1 \mapsto 10, L_2 \mapsto 20, L_3 \mapsto 30\}$.

a. What is $E(\texttt{a})$?

b. What is $E(\texttt{c})$?

c. What is $Dom(E)$?

d. What is $E + \{\texttt{d} \mapsto L_2\}$?

e. What is $E + \{\texttt{b} \mapsto L_3\}$?

f. What is $S(L_2)$?

g. What is $S(E(\texttt{a}))$?

h. What is $Dom(S)$?

i. What is $S - \{L_2\}$?

2. Draw a derivation tree for `(let x 10 (+ x (:= x 21)))` in an empty environment and store.

3. (a) Suppose we want to add a sequencing expression to our language, where `(; exp1 exp2)` evaluates `exp1` and then `exp2`, and returns the value of `exp2`. Write down a suitable operational semantics rule for this expression.

(b) Does adding this sequencing expression to our language really give us fundamentally new power? I.e., is there is an equivalent way to get the same behavior using existing expressions?