Amal's SoupPCF

Hyeyoung Shin
shin.hy@husky.neu.edu

31 Jan 2018

1 Syntax

$t ::= \text{unit} \mid \text{int} \mid t_1 \to t_2 \mid \text{LS}$
$e ::= () \mid n \mid \text{if0 } e_1 e_2 e_3 \mid e_1 \text{ p } e_2 \mid x \mid \text{lam } x : t.e \mid e_1 e_2 \mid \text{nil} \mid \text{cons-l } e_1 e_2 \mid \text{cons-s } e \mid$
$\text{case } e \text{ of } nil \Rightarrow e_1; \text{cons-l } x\ rx \Rightarrow e_2; \text{cons-s } x \Rightarrow e_3$
$p ::= + \mid -$
$\Gamma ::= . \mid \Gamma, x : t$

2 Typing Judgement

$$\frac{}{\Gamma \vdash \text{nil} : \text{LS}} \quad \text{T-NIL}$$

$$\frac{\Gamma \vdash e_1 : \text{int} \quad \Gamma \vdash e_2 : \text{ LS}}{\Gamma \vdash \text{ cons-l } e_1 e_2 : \text{LS}} \quad \text{T-CONS-L} \qquad \frac{\Gamma \vdash e : \text{unit}}{\Gamma \vdash \text{ cons-s } e : \text{LS}} \quad \text{T-CONS-S}$$

$$\frac{\Gamma \vdash e : \text{ LS} \quad \Gamma \vdash e_1 : t \quad \Gamma, x : \text{ int}, \ rx : \text{ LS} \vdash e_2 : t \quad \Gamma, x : \text{ unit} \to \text{ LS} \vdash e_3 : t}{\Gamma \vdash \text{ case } e \text{ of nil } \Rightarrow e_1; \text{ cons-l } x\ rx \Rightarrow e_2; \text{ cons-s } x \Rightarrow e_3 : t} \quad \text{T-CASE}$$

3 CBV Operational Semantics

$v ::= () \mid n \mid \text{ lam } x : t.e \mid \text{ nil } \mid \text{ cons-l } v_1\ v_2 \mid \text{ cons-s } v$
$E ::= [.] \mid \text{if0 } E\ e_2\ e_3 \mid E\ p\ e_2 \mid v_1\ p\ E \mid E\ e_2 \mid v_1\ E \mid \text{ cons-l E} e_2 \mid \text{ cons-l } v\ E \mid \text{ cons-s E} \mid$
$\text{case } E \text{ of nil} \Rightarrow e_1; \text{ cons-l } x\ rx \Rightarrow e_2; \text{ cons-s } x \Rightarrow e_3$