

1 Labelled Transition System for repeated Head Linear Reduction

1.1 Notes

State is a tuple $\langle \lambda\text{-term with underlined node, context, list of arguments} \rangle$, where

- λ -term (a tree; by considering λ -term as a tree it becomes possible to cross arguments out of tree (*... without term*)) with underlined node is a usual lambda term with one underlined position;
- context Γ is an unordered list of pair (*variable : term*);
- list of arguments Δ is an ordered list of λ -terms. (one can also think about Δ as unordered list of pointers to the corresponding subtree)

1.2 Rules

1. (App)

$$\dots_1 (e_1 @ e_2) \dots_2; \Gamma; \Delta \longrightarrow \dots_1 (\underline{e_1} @ e_2) \dots_2; \Gamma; e_2 : \Delta$$

2. (Lam-elim)

$$\dots_1 (\lambda x. e_1) \dots_2; x : B, \Gamma; B, \Delta \longrightarrow \dots_1 (\underline{e_1}) (\dots_2 \text{ without } B); x : B, \Gamma; \Delta$$

3. (Lam-non-elim)

$$\dots_1 (\lambda x. e_1) \dots_2; x : B, \Gamma; \$, \Delta \longrightarrow \dots_1 (\lambda x. \underline{e_1}) \dots_2; \Gamma; \$, \Delta$$

4. (BVar)

$$\dots_1 \underline{x} \dots_2; x : B, \Gamma; \Delta \longrightarrow \dots_1 \underline{B} \dots_2; x : B, \Gamma; \Delta$$

5. (FVar-pause-0)

$$\dots_1 (\dots_2 \underline{x}) \dots) @ B \dots_3; (x : _) \notin \Gamma; B, \Delta \longrightarrow \dots_1 (\dots_2 x) \dots) @ \underline{B} \dots_3; \Gamma; \$, \Delta$$

6. (FVar-pause-1)

$$\dots_1 (\dots_2 \underline{x}) \dots) @ B \dots_3; (x : _) \notin \Gamma; \$, B, \Delta \longrightarrow \dots_1 (\dots_2 x) \dots) @ \underline{B} \dots_3; \Gamma; \$, \Delta$$

7. (FVar-pause-2)

$$\dots_1 \underline{x} \dots_2; (x : _) \notin \Gamma; \$, \$, \Delta \longrightarrow \dots_1 \underline{x} \dots_2; \Gamma; \$, \Delta$$

8. (FVar-stuck-0)

$$\dots \underline{x} \dots; (x : _) \notin \Gamma; \emptyset \longrightarrow \text{THE END}$$

9. (FVar-stuck-1)

$$\dots \underline{x} \dots; (x : _) \notin \Gamma; \$, \dots, \$, \emptyset \longrightarrow \text{THE END}$$