LAMBDA

MODULE LAMBDA

SYNTAX $\mathit{Exp} ::= \mathit{Id}$
$\quad | \ \lambda \mathit{Id}.\mathit{Exp}$
$\quad | \ \mathit{Exp}\ \ \mathit{Exp}$ [strict(strict())]
$\quad | \ (\mathit{Exp})$ [bracket(bracket())]

CONFIGURATION:

$$\left\langle \left\langle \$PGM\!:\!Exp \right\rangle_{\mathsf{k}} \ \left\langle \texttt{.Map} \right\rangle_{\mathsf{env}} \ \left\langle \texttt{.Map} \right\rangle_{\mathsf{store}} \right\rangle_{\mathsf{T}}$$

SYNTAX $\mathit{Val} ::= \texttt{closure}\ (\mathit{Map}, \mathit{Id}, \mathit{Exp})$ [klabel(klabel('closure))]

SYNTAX $\mathit{Exp} ::= \mathit{Val}$

SYNTAX $\mathit{KResult} ::= \mathit{Val}$

RULE $\left\langle \frac{\lambda X\!:\!Id.E}{\texttt{closure}\ (\rho, X, E)} \cdots \right\rangle_{\mathsf{k}} \ \left\langle \rho \right\rangle_{\mathsf{env}}$ [structural(structural())]

RULE $\left\langle \frac{\texttt{closure}\ (\rho, X, E)\ \ V\!:\!Val}{E \frown \rho'} \cdots \right\rangle_{\mathsf{k}} \ \left\langle \frac{\rho'}{\rho[X \texttt{ <- } N]} \right\rangle_{\mathsf{env}} \ \left\langle \cdots \frac{\texttt{.Map}}{(N\!:\!Int \mapsto V)} \cdots \right\rangle_{\mathsf{store}}$

RULE $\left\langle \frac{X}{V} \cdots \right\rangle_{\mathsf{k}} \ \left\langle \cdots X \mapsto N \cdots \right\rangle_{\mathsf{env}} \ \left\langle \cdots N \mapsto V \cdots \right\rangle_{\mathsf{store}}$

RULE $\left\langle \text{—:Val} \frown \frac{\rho}{\cdot_K} \cdots \right\rangle_{\mathsf{k}} \ \left\langle \frac{\text{—}}{\rho} \right\rangle_{\mathsf{env}}$ [structural(structural())]

SYNTAX $\mathit{Val} ::= \mathit{Int}$
$\quad | \ \mathit{Bool}$

SYNTAX $\mathit{Exp} ::= \mathit{Exp} * \mathit{Exp}$ [strict(strict())]
$\quad | \ \mathit{Exp}\ \texttt{/}\ \mathit{Exp}$ [strict(strict())]
$\quad | \ \mathit{Exp}\ \texttt{+}\ \mathit{Exp}$ [strict(strict())]
$\quad | \ \mathit{Exp}\ \texttt{<=}\ \mathit{Exp}$ [strict(strict())]

RULE $\frac{I1 * I2}{I1 *_{Int} I2}$

RULE $\frac{I1 \texttt{ / } I2}{I1 \div_{Int} I2}$

RULE $\frac{I1 \texttt{ + } I2}{I1 +_{Int} I2}$

RULE $\frac{I1 \texttt{ <= } I2}{I1 \leq_{Int} I2}$

SYNTAX $\mathit{Exp} ::= \texttt{if}\ \mathit{Exp}\ \texttt{then}\ \mathit{Exp}\ \texttt{else}\ \mathit{Exp}$ [strict(strict(1))]

RULE $\frac{\texttt{if true then } E \texttt{ else } \text{—}}{E}$

RULE $\frac{\texttt{if false then } \text{—} \texttt{ else } E}{E}$

SYNTAX $\mathit{Exp} ::= \texttt{let}\ \mathit{Id} = \mathit{Exp}\ \texttt{in}\ \mathit{Exp}$

RULE $\frac{\texttt{let } X = E \texttt{ in } E'\!:\!Exp}{(\lambda X.E')\ \ E}$ [macro(macro())]

SYNTAX $\mathit{Exp} ::= \texttt{letrec}\ \mathit{Id}\ \ \mathit{Id} = \mathit{Exp}\ \texttt{in}\ \mathit{Exp}$
$\quad | \ \mu \mathit{Id}.\mathit{Exp}$

RULE $\frac{\texttt{letrec } F\!:\!Id\ \ X = E \texttt{ in } E'}{\texttt{let } F = \mu F.\lambda X.E \texttt{ in } E'}$ [macro(macro())]

SYNTAX $\mathit{Exp} ::= \texttt{muclosure}\ (\mathit{Map}, \mathit{Exp})$ [klabel(klabel('muclosure))]

RULE $\left\langle \frac{\mu X.E}{\texttt{muclosure}\ (\rho[X \texttt{ <- } N], E)} \cdots \right\rangle_{\mathsf{k}} \ \left\langle \rho \right\rangle_{\mathsf{env}} \ \left\langle \cdots \frac{\texttt{.Map}}{(N\!:\!Int \mapsto \texttt{muclosure}\ (\rho[X \texttt{ <- } N], E))} \cdots \right\rangle_{\mathsf{store}}$ [structural(structural())]

RULE $\left\langle \frac{\texttt{muclosure}\ (\rho, E)}{E \frown \rho'} \cdots \right\rangle_{\mathsf{k}} \ \left\langle \frac{\rho'}{\rho} \right\rangle_{\mathsf{env}}$

SYNTAX $\mathit{Exp} ::= \texttt{callcc}\ \mathit{Exp}$ [strict(strict())]

SYNTAX $\mathit{Val} ::= \texttt{cc}\ (\mathit{Map}, K)$ [klabel(klabel('cc))]

RULE $\left\langle \frac{\texttt{callcc}\ V\!:\!Val \frown K}{V\ \ \texttt{cc}\ (\rho, K)} \right\rangle_{\mathsf{k}} \ \left\langle \rho \right\rangle_{\mathsf{env}}$

RULE $\left\langle \frac{\texttt{cc}\ (\rho, K)\ \ V\!:\!Val \frown \text{—}}{V \frown K} \right\rangle_{\mathsf{k}} \ \left\langle \frac{\text{—}}{\rho} \right\rangle_{\mathsf{env}}$

END MODULE