Intermediate machine: indirection tables

%datatype *clos*
%datatype *c-env*
%datatype *k-env*
%datatype *stack*

%name *clos* $\tilde{c}$
%name *c-env* $\tilde{\mathcal{E}}$
%name *k-env* $\tilde{\mathcal{E}}_\mu$
%name *stack* $\tilde{\mathcal{S}}$

$$\tilde{c} \quad ::= \quad (t, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu)$$

$$\begin{array}{lcl} \tilde{\mathcal{E}} & ::= & () \\ & | & (\tilde{c}; \tilde{\mathcal{E}}) \end{array}$$

$$\begin{array}{lcl} \tilde{\mathcal{E}}_\mu & ::= & () \\ & | & (\tilde{\mathcal{S}}; \tilde{\mathcal{E}}_\mu) \end{array}$$

$$\begin{array}{lcl} \tilde{\mathcal{S}} & ::= & [] \\ & | & \tilde{c} :: \tilde{\mathcal{S}} \end{array}$$

%datatype *state*

%name *state* $\tilde{\sigma}$

$$\tilde{\sigma} \quad ::= \quad \langle t, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \tilde{\mathcal{S}} \rangle$$

Intermediate machine: evaluation rules

%judgment $\tilde{\sigma}_1 \rightsquigarrow \tilde{\sigma}_2$

$$\langle l, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \tilde{\mathcal{S}} \rangle \rightsquigarrow \langle t, n', \mathcal{I}', \mathcal{I}'_\mu, \tilde{\mathcal{E}}', \tilde{\mathcal{E}}'_\mu, \tilde{\mathcal{S}} \rangle \qquad \text{[i·var]}$$
$$\textit{when} \quad n \dot{-} \mathcal{I}(l) = g, \quad \tilde{\mathcal{E}}(g) = \big(t, n', \mathcal{I}', \mathcal{I}'_\mu, \tilde{\mathcal{E}}', \tilde{\mathcal{E}}'_\mu\big)$$

$$\langle (t\,u), n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \tilde{\mathcal{S}} \rangle \rightsquigarrow \langle t, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \big(u, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu\big) :: \tilde{\mathcal{S}} \rangle \qquad \text{[i·app]}$$

$$\langle \lambda t, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \tilde{c} :: \tilde{\mathcal{S}} \rangle \rightsquigarrow \langle t, n+1, (n+1 :: \mathcal{I}), \mathcal{I}_\mu, (\tilde{c}; \tilde{\mathcal{E}}), \tilde{\mathcal{E}}_\mu, \tilde{\mathcal{S}} \rangle \qquad \text{[i·abs]}$$

$$\langle \textbf{get-context}\, t, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \tilde{\mathcal{S}} \rangle \rightsquigarrow \langle t, n, \mathcal{I}, (\mathcal{I} :: \mathcal{I}_\mu), \tilde{\mathcal{E}}, \big(\tilde{\mathcal{S}}; \tilde{\mathcal{E}}_\mu\big), \tilde{\mathcal{S}} \rangle \qquad \text{[i·catch]}$$

$$\langle \textbf{set-context}\, \alpha\, t, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \tilde{\mathcal{S}} \rangle \rightsquigarrow \langle t, n, \mathcal{I}', \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu, \tilde{\mathcal{S}}' \rangle \qquad \text{[i·throw]}$$
$$\textit{when} \quad \mathcal{I}_\mu(\alpha) = \mathcal{I}', \quad \tilde{\mathcal{E}}_\mu(\alpha) = \tilde{\mathcal{S}}'$$

%unique $+\sigma_1 \rightsquigarrow -1\sigma_2$

Translation (-)*

%judgment $\tilde{c}^\star = c$
%judgment $\tilde{\mathcal{S}}^\star = \mathcal{S}$
%judgment $\tilde{\mathcal{E}}^\star = \mathcal{E}$
%judgment $\tilde{\mathcal{E}}_\mu{}^\star = \mathcal{E}_\mu$

$$\big(t, n, \mathcal{I}, \mathcal{I}_\mu, \tilde{\mathcal{E}}, \tilde{\mathcal{E}}_\mu\big)^\star = (u, \mathcal{E}, \mathcal{E}_\mu)\ ^{[\mathrm{clos}^\star]} \quad \textit{when} \quad \downarrow_n^{\mathcal{I},\mathcal{I}_\mu}(t) = u, \quad \tilde{\mathcal{E}}^\star = \mathcal{E}, \quad \tilde{\mathcal{E}}_\mu{}^\star = \mathcal{E}_\mu$$

The definitions of the remaining judgments are compositional:

$$[]^\star = []\ ^{[\mathrm{stack}^\star_1]}$$
$$\big(\tilde{c} :: \tilde{\mathcal{S}}\big)^\star = c :: \mathcal{S}\ ^{[\mathrm{stack}^\star_2]} \quad \textit{when} \quad \tilde{c}^\star = c, \quad \tilde{\mathcal{S}}^\star = \mathcal{S}$$

$$()^\star = ()\ ^{[\mathrm{c{\cdot}env}^\star_1]}$$
$$(\tilde{c}; \tilde{\mathcal{E}})^\star = (c; \mathcal{E})\ ^{[\mathrm{c{\cdot}env}^\star_2]} \quad \textit{when} \quad \tilde{c}^\star = c, \quad \tilde{\mathcal{E}}^\star = \mathcal{E}$$

$$()^\star = ()\ ^{[\mathrm{k{\cdot}env}^\star_1]}$$
$$\big(\tilde{\mathcal{S}}; \tilde{\mathcal{E}}_\mu\big)^\star = (\mathcal{S}; \mathcal{E}_\mu)\ ^{[\mathrm{k{\cdot}env}^\star_2]} \quad \textit{when} \quad \tilde{\mathcal{S}}^\star = \mathcal{S}, \quad \tilde{\mathcal{E}}_\mu{}^\star = \mathcal{E}_\mu$$