Long-distance interaction between caller and callee

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$$
\begin{array}{lll}
t ::= & & \text{term} \\
& v & \text{value} \\
& x & \text{variable} \\
& t\ t & \text{application} \\
& \text{provide } S \text{ as } \varepsilon \text{ in } t & \text{provide} \\
v ::= & & \text{value} \\
& c & \text{constant} \\
& \lambda x : \tau\ .\ t & \text{abstraction} \\
S ::= & & \text{effect handler} \\
& \varnothing_S & \text{empty handler} \\
& S, s = t & \text{handler extension} \\
\Delta ::= & & \text{effect map} \\
& \varnothing_\Delta & \text{empty effect map} \\
& \Delta, \varepsilon = \Gamma & \text{effect map extension} \\
\tau ::= & & \text{type} \\
& \kappa & \text{type of constants} \\
& \sigma \to \sigma & \text{arrow type} \\
\sigma ::= & & \text{type with effects} \\
& E\ !\ \tau & \text{effect annotation} \\
E ::= & & \text{effect set} \\
& \varnothing_\varepsilon & \text{empty effect} \\
& E, \varepsilon & \text{effect extension} \\
\Gamma ::= & & \text{context} \\
& \varnothing_\Gamma & \text{empty context} \\
& \Gamma, x : \tau & \text{variable binding}
\end{array}
$$

Figure 1: Syntax

$$\boxed{\Gamma \vdash t : \sigma}$$

$$\frac{}{\Gamma \vdash c : \varnothing_\varepsilon \, ! \, \kappa} \; \text{(T-Constant)}$$

$$\frac{x : \sigma \in \Gamma}{\Gamma \vdash x : \sigma} \; \text{(T-Variable)}$$

$$\frac{\Gamma, x : \tau \vdash t : \sigma}{\Gamma \vdash \lambda x : \tau \,.\, t : \tau \rightarrow \sigma} \; \text{(T-Abstraction)}$$

$$\frac{\Gamma \vdash t_1 : E_1 \, ! \, \tau_1 \qquad \Gamma \vdash t_2 : E_2 \, ! \, (\tau_1 \rightarrow E_3 \, ! \, \tau_2)}{\Gamma \vdash t_2 \, t_1 : E_1, E_2, E_3 \, ! \, \tau_2} \; \text{(T-Application)}$$

$$\frac{\Gamma \vdash t : E \, ! \, \tau}{\Gamma \vdash t : E, \varepsilon \, ! \, \tau} \; \text{(T-Weaken)}$$

$$\frac{\begin{array}{c} S = (\varnothing_S, s_1 = t_1, \ldots, s_n = t_n) \\ \Gamma \vdash t_i : E_i \, ! \, \tau_i \\ \sigma_i = E_i, \varepsilon \, ! \, \tau_i \\ \varepsilon = \varnothing_\Gamma, s_1 : \sigma_1, \ldots, s_n : \sigma_n \in \Delta \\ \Gamma, s_1 : \sigma_1, \ldots, s_n : \sigma_n \vdash t : E \, ! \, \tau \end{array}}{\Gamma \vdash \text{provide } S \text{ as } \varepsilon \text{ in } t : E - \varepsilon \, ! \, \tau} \; \text{(T-Provide)}$$

Figure 2: Typing rules