Long-distance interaction between caller and callee

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

Figure 1: Syntax

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

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

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

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

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

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

$$\frac{\begin{array}{c} S = \{s_1 = t_1, \ldots, s_n = t_n\} \\ \Gamma \vdash t_i : E_i \mathbin{!} \tau_i \\ \sigma_i = \varepsilon \mathbin{!} \tau_i \\ \Phi(\varepsilon) = \{s_1 = \sigma_1, \ldots, s_n = \sigma_n\} \\ \Gamma, s_1 : \sigma_1, \ldots, s_n : \sigma_n \vdash t : E \mathbin{!} \tau \end{array}}{\Gamma \vdash \text{provide } S \text{ as } \varepsilon \text{ in } t : E - \varepsilon, E_1, \ldots, E_n \mathbin{!} \tau} \text{ (T-Provide)}$$

Figure 2: Typing rules