Bidirectional Binding Signature

$$\frac{\rho\colon \mathsf{Sub}_{\Sigma}(\Xi,\emptyset) \qquad \Gamma, \vec{x}_1 : \Delta_1\langle\rho\rangle \vdash_{\Sigma,\Omega} t_1 :^{d_1} A_1\langle\rho\rangle \qquad \cdots \qquad \Gamma, \vec{x}_n : \Delta_n\langle\rho\rangle \vdash_{\Sigma,\Omega} t_n :^{d_n} A_n\langle\rho\rangle}{\Gamma \vdash_{\Sigma,\Omega} \mathsf{op}_o(\vec{x}_1.\, t_1; \ldots; \vec{x}_n.\, t_n) :^{d} A_0\langle\rho\rangle}\ \textsc{Op}$$

$$\text{for } o\colon \Xi \rhd [\Delta_1]A_1^{d_1}, \ldots, [\Delta_n]A_n^{d_n} \to A_0^{d} \text{ in } \Omega$$

Bidirectional Type System

is either

(synthesis) or

(checking)

d_i

$\Rightarrow$

$\Leftarrow$

$$\frac{\Gamma \vdash_{\Sigma,\Omega} t :^{\Rightarrow} B \qquad B = A}{\Gamma \vdash_{\Sigma,\Omega} t :^{\Leftarrow} A}\ \textsc{Sub}^{\Leftarrow}$$

$$\frac{\Gamma \vdash_{\Sigma,\Omega} t :^{\Leftarrow} A}{\Gamma \vdash_{\Sigma,\Omega} (t \mathbin{\raisebox{0.2ex}{$\circ$}\!\!\!\raisebox{-0.4ex}{$\circ$}} A) :^{\Rightarrow} A}\ \textsc{Anno}^{\Rightarrow}$$

$$\frac{(x : A) \in \Gamma}{\Gamma \vdash_{\Sigma,\Omega} x :^{\Rightarrow} A}\textsc{Var}^{\Rightarrow}$$

$$\Gamma \vdash_{\Sigma,\Omega} t :^{d} A$$

$$\dfrac{\rho\colon \mathsf{Sub}_{\Sigma}(\Xi, \emptyset) \qquad \Gamma, \vec{x}_1 : \Delta_1\langle\rho\rangle \vdash_{\Sigma,\Omega} t_1 :^{d_1} A_1\langle\rho\rangle \qquad \cdots \qquad \Gamma, \vec{x}_n : \Delta_n\langle\rho\rangle \vdash_{\Sigma,\Omega} t_n :^{d_n} A_n\langle\rho\rangle}{\Gamma \vdash_{\Sigma,\Omega} \mathsf{op}_o(\vec{x}_1.\, t_1; \ldots; \vec{x}_n.\, t_n) :^{d} A_0\langle\rho\rangle}\ \textsc{Op}$$

$$\text{for } o\colon \Xi \rhd [\Delta_1]A_1^{d_1}, \ldots, [\Delta_n]A_n^{d_n} \to A_0^{d} \text{ in } \Omega$$