

Grammar - Types

(Base types) $A, B ::= \mathbf{unit} \mid A_1 \oplus \dots \oplus A_n \mid A_1 \otimes \dots \otimes A_n \mid \mu X.A \mid X$
 (Isos) $T ::= A \leftrightarrow B \mid T_1 \rightarrow T_2$

Grammar - Terms

(Values) $v ::= () \mid x \mid c \ v \mid (v_1, \dots, v_n)$
 (Patterns) $p ::= x \mid (p_1, \dots, p_n)$
 (Expressions) $e ::= v \mid \mathbf{let} \ p_1 = \omega \ p_2 \ \mathbf{in} \ e$
 (Isos) $\omega ::= \{v_1 \leftrightarrow e_1 \mid \dots \mid v_n \leftrightarrow e_n\} \mid \mathbf{fix} \ \phi.\omega \mid \lambda\phi.\omega \mid \phi \mid \omega_1 \ \omega_2$
 (Terms) $t ::= () \mid x \mid (t_1, \dots, t_n) \mid \omega \ t \mid \mathbf{let} \ p = t_1 \ \mathbf{in} \ t_2$

Typing Rules - Terms

$$\begin{array}{c}
 \frac{}{\Psi; \emptyset \vdash () : \mathbf{unit}} \quad \frac{}{\Psi; x : A \vdash x : A} \quad \frac{\Psi; \Delta_1 \vdash t_1 : A_1 \quad \dots \quad \Psi; \Delta_n \vdash t_n : A_n}{\Psi; \Delta \vdash (t_1, \dots, t_n) : A_1 \otimes \dots \otimes A_n} \\
 \frac{\Psi \vdash_\omega \omega : A \leftrightarrow B \quad \Psi; \Delta \vdash t : A}{\Psi; \Delta \vdash \omega \ t : B} \\
 \frac{\Psi; \Delta_1 \vdash t_1 : A_1 \otimes \dots \otimes A_n \quad \Psi; \Delta_2 \vdash x_1 : A_1, \dots, x_n : A_n \vdash t_2 : B}{\Psi; \Delta_1, \Delta_2 \vdash \mathbf{let} \ (x_1, \dots, x_n) = t_1 \ \mathbf{in} \ t_2 : B}
 \end{array}$$

Typing Rules - Isos

$$\begin{array}{c}
 \frac{}{\Psi; \phi : T \vdash_\omega \phi : T} \quad \frac{\Psi \vdash_\omega \omega_1 : T_1 \quad \Psi \vdash_\omega \omega_2 : T_1 \rightarrow T_2}{\Psi \vdash_\omega \omega_2 \ \omega_1 : T_2} \quad \frac{\Psi, \phi : T_1 \vdash_\omega \omega : T_2}{\Psi \vdash_\omega \lambda\phi.\omega : T_1 \rightarrow T_2} \\
 \frac{\Psi; \Delta_1 \vdash v_1 : A \quad \dots \quad \Psi; \Delta_n \vdash v_n : A \quad \forall i \neq j, v_i \perp v_j \quad \Psi; \Delta_1 \vdash e_1 : B \quad \dots \quad \Psi; \Delta_n \vdash e_n : B \quad \forall i \neq j, e_i \perp e_j}{\Psi \vdash_\omega \{v_1 \leftrightarrow e_1 \mid \dots \mid v_n \leftrightarrow e_n\} : A \leftrightarrow B}
 \end{array}$$