

# A Variant of STLC

$$\begin{aligned} e & ::= x \mid \lambda x. e \mid e e \mid (e, e) \mid e.1 \mid e.2 \\ & \quad \mid \mathbf{A}(e) \mid \mathbf{B}(e) \mid \mathbf{match} \ e \ \mathbf{with} \ \mathbf{Ax}. e \mid \mathbf{Bx}. e \\ \tau & ::= b \mid \tau \rightarrow \tau \mid \tau * \tau \mid \tau + \tau \\ \Gamma & ::= \cdot \mid \Gamma, x:\tau \end{aligned}$$

$$\boxed{\Gamma \vdash e : \tau}$$

$$\frac{\Gamma \vdash e_1 : \tau_1 \quad \Gamma \vdash e_2 : \tau_2}{\Gamma \vdash (e_1, e_2) : \tau_1 * \tau_2} \quad \frac{\Gamma \vdash e : \tau_1 * \tau_2}{\Gamma \vdash e.1 : \tau_1} \quad \frac{\Gamma \vdash e : \tau_1 * \tau_2}{\Gamma \vdash e.2 : \tau_2}$$

$$\frac{\Gamma \vdash e : \tau_1}{\Gamma \vdash \mathbf{A}(e) : \tau_1 + \tau_2} \quad \frac{\Gamma \vdash e : \tau_2}{\Gamma \vdash \mathbf{B}(e) : \tau_1 + \tau_2}$$

$$\frac{\Gamma \vdash e : \tau_1 + \tau_2 \quad \Gamma, x:\tau_1 \vdash e_1 : \tau \quad \Gamma, y:\tau_2 \vdash e_2 : \tau}{\Gamma \vdash \mathbf{match} \ e \ \mathbf{with} \ \mathbf{Ax}. e_1 \mid \mathbf{By}. e_2 : \tau}$$

$$\frac{\Gamma(x) = \tau}{\Gamma \vdash x : \tau} \quad \frac{\Gamma, x : \tau_1 \vdash e : \tau_2}{\Gamma \vdash \lambda x. e : \tau_1 \rightarrow \tau_2} \quad \frac{\Gamma \vdash e_1 : \tau_2 \rightarrow \tau_1 \quad \Gamma \vdash e_2 : \tau_2}{\Gamma \vdash e_1 e_2 : \tau_1}$$