Polymorphic parameters

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1 Grammer

1.1 Meta-variables

termvar, x
typevar, α
label, i

1.2 Productions

types, τ	::=	
	|	α
	|	$\sigma \to_i \tau$
schemes, σ	::=	
	|	τ
	|	$\forall \alpha.\sigma$
generic_schemes, ς	::=	
	|	σ
	|	$\forall i.\varsigma$
unlabelled_types, t	::=	
	|	α
	|	$s \to t$
unlabelled_schemes, s	::=	
	|	t
	|	$\forall\, \alpha.s$
expressions, e	::=	
	|	x
	|	$\lambda x.e$
	|	$\lambda (x : s).e$
	|	$e_1\ e_2$
	|	$\textbf{let}\ x = e_1\ \textbf{in}\ e_2$
	|	$(e : t)$
context, Γ	::=	
	|	ε
	|	$\Gamma, x : \varsigma$

2 Typing judgements

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

$$\frac{\Gamma(x) = \varsigma}{\Gamma \vdash x : \varsigma}\ \text{TYP\_VAR} \qquad \frac{\Gamma, x : \tau_1 \vdash e : \tau_2}{\Gamma \vdash \lambda x.e : \tau_1 \to_i \tau_2}\ \text{TYP\_ABS} \qquad \frac{\begin{array}{c} s \sim \varsigma \\ s \sim \sigma \\ \Gamma, x : \varsigma \vdash e : \tau \end{array}}{\Gamma \vdash \lambda(x : s).e : \sigma \to_i \tau}\ \text{TYP\_POLY\_ABS}$$

$$\frac{\begin{array}{c} \Gamma \vdash e_1 : \tau_1 \to_i \tau_2 \\ \Gamma \vdash e_2 : \tau_1 \end{array}}{\Gamma \vdash e_1\ e_2 : \tau_2}\ \text{TYP\_APP} \qquad \frac{\begin{array}{c} \Gamma \vdash e_1 : \forall i.\sigma \to_i \tau_2 \\ \Gamma \vdash e_2 : \sigma \end{array}}{\Gamma \vdash e_1\ e_2 : \tau_2}\ \text{TYP\_POLY\_APP}$$

$$\frac{\begin{array}{c} \Gamma \vdash e_1 : \varsigma \\ \Gamma, x : \varsigma \vdash e_2 : \tau \end{array}}{\Gamma \vdash \textbf{let}\ x = e_1\ \textbf{in}\ e_2 : \tau}\ \text{TYP\_LET} \qquad \frac{\begin{array}{c} \Gamma \vdash e : \sigma \\ \alpha \notin FV(\Gamma) \end{array}}{\Gamma \vdash e : \forall \alpha.\sigma}\ \text{TYP\_GEN\_TYP} \qquad \frac{\begin{array}{c} \Gamma \vdash e : \varsigma \\ i \notin FL(\Gamma) \end{array}}{\Gamma \vdash e : \forall i.\varsigma}\ \text{TYP\_GEN\_LABEL}$$

$$\frac{\Gamma \vdash e : \forall \alpha.\sigma}{\Gamma \vdash e : \sigma[\alpha \mapsto \tau]}\ \text{TYP\_INST\_TYP} \qquad \frac{\Gamma \vdash e : \forall i_1.\varsigma}{\Gamma \vdash e : \varsigma[i_1 \mapsto i_2]}\ \text{TYP\_INST\_LABEL} \qquad \frac{\begin{array}{c} t \sim \varsigma_1 \\ t \sim \varsigma_2 \\ \Gamma \vdash e : \varsigma_1 \end{array}}{\Gamma \vdash (e : t) : \varsigma_2}\ \text{TYP\_ANNOT}$$