Term variables, x, y, z	variables
Type variables, a, b	type variables
Integer, i	

Monotypes, τ	$::=$			Monotypes
	$\|$	$\texttt{Int}$		
	$\|$	a		
	$\|$	$\tau_1 \rightarrow \tau_2$		
Rho-types, ρ	$::=$			Rho-types
	$\|$	τ		
	$\|$	(ρ)	S	
	$\|$	$[a \mapsto \tau]\,\mathbf{rhp}$	M	
Polytypes, σ	$::=$			
	$\|$	ρ		
	$\|$	$\forall a.\sigma$	bind a in σ	
	$\|$	$[a \mapsto \tau]\,\sigma$	M	
Terms, t, u	$::=$			
	$\|$	i		Literal
	$\|$	x		Variable
	$\|$	$\lambda x.t$	bind x in t	Abstraction
	$\|$	$t\ u$		Application
	$\|$	$\lambda(x :: \sigma).t$	bind x in t	Typed abstraction
	$\|$	$\texttt{let}\ x = u\ \texttt{in}\ t$	bind x in t	Local binding
	$\|$	$t :: \sigma$		Type annotation
	$\|$	(t)	S	
	$\|$	$t\,[x \leadsto t']$	M	
value, v	$::=$			
	$\|$	i		
	$\|$	$\lambda x.t$	bind x in t	
	$\|$	$\lambda(x :: \sigma).t$	bind x in t	
Typing contexts, Γ	$::=$			
	$\|$	ϵ		empty context
	$\|$	$\Gamma, x : \sigma$		assumption
fv	$::=$			
	$\|$	$\mathit{fv}(t)$	M	
ftvany	$::=$			
	$\|$	$\mathrm{ftv}(\tau)$	M	
	$\|$	$\mathrm{ftv}(\rho)$	M	
	$\|$	$\mathrm{ftv}(\sigma)$	M	
	$\|$	$\mathrm{ftv}(\Gamma)$	M	
terminals	$::=$			
	$\|$	$\longrightarrow$		
	$\|$	$\rightarrow$		
	$\|$	$::$		
	$\|$	fv		

	$\mid$	ftv
	$\mid$	$\in$
	$\mid$	$\notin$
	$\mid$	$\vdash$
formula	$::=$	
	$\mid$	*judgement*
	$\mid$	$\mathsf{value}\, v$
	$\mid$	$\mathsf{uniq}\, \Gamma$
	$\mid$	$\mathsf{lc}\, \sigma$
	$\mid$	$a \notin \mathit{ftvany}$
	$\mid$	$x : \sigma \; \in \; \Gamma$
JTyping	$::=$	
	$\mid$	$\Gamma \vdash t : \sigma$
JStep	$::=$	
	$\mid$	$t \longrightarrow u$
JInst	$::=$	
	$\mid$	$\vdash^{\text{inst}} \sigma \leq \rho$
judgement	$::=$	
	$\mid$	*JTyping*
	$\mid$	*JStep*
	$\mid$	*JInst*
user_syntax	$::=$	
	$\mid$	Term variables
	$\mid$	Type variables
	$\mid$	Integer
	$\mid$	Monotypes
	$\mid$	Rho-types
	$\mid$	Polytypes
	$\mid$	Terms
	$\mid$	*value*
	$\mid$	Typing contexts
	$\mid$	*fv*
	$\mid$	*ftvany*
	$\mid$	*terminals*
	$\mid$	*formula*

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

$$\frac{}{\Gamma \vdash i : \mathtt{Int}} \quad \text{TYP\_INT}$$

$$\frac{\begin{array}{l}\mathsf{uniq}\, \Gamma \\ x : \sigma \; \in \; \Gamma\end{array}}{\Gamma \vdash x : \sigma} \quad \text{TYP\_VAR}$$

$$\frac{\Gamma, x : \tau_1 \vdash t : \tau_2}{\Gamma \vdash (\lambda x . t) : (\tau_1 \to \tau_2)} \quad \text{TYP\_ABS}$$

$$\frac{\Gamma \vdash t : \tau_1 \to \tau_2 \quad \Gamma \vdash u : \tau_1}{\Gamma \vdash t\ u : \tau_2} \quad \text{TYP\_APP}$$

$$\frac{\Gamma \vdash u : \sigma \quad \Gamma, x : \sigma \vdash t : \rho}{\Gamma \vdash \mathtt{let}\ x = u\ \mathtt{in}\ t : \rho} \quad \text{TYP\_LET}$$

$$\frac{\mathsf{lc}\,\sigma \quad \Gamma \vdash t : \sigma}{\Gamma \vdash (t :: \sigma) : \sigma} \quad \text{TYP\_ANNOT}$$

$$\frac{\Gamma \vdash t : \rho}{\Gamma \vdash t : \forall a.\rho} \quad \text{TYP\_GEN}$$

$$\frac{\Gamma \vdash t : \forall a.\rho}{\Gamma \vdash t : [a \mapsto \tau]\,\rho} \quad \text{TYP\_INST}$$

$\boxed{t \longrightarrow u}$

$$\frac{u \longrightarrow u'}{\mathtt{let}\ x = u\ \mathtt{in}\ t \longrightarrow \mathtt{let}\ x = u'\ \mathtt{in}\ t} \quad \text{STEP\_LET1}$$

$$\frac{}{\mathtt{let}\ x = v\ \mathtt{in}\ t \longrightarrow t\,[x \rightsquigarrow v]} \quad \text{STEP\_LET}$$

$$\frac{t \longrightarrow t'}{t\ u \longrightarrow t'\ u} \quad \text{STEP\_APP1}$$

$$\frac{u \longrightarrow u'}{(\lambda x.t)\ u \longrightarrow (\lambda x.t)\ u'} \quad \text{STEP\_APP2}$$

$$\frac{}{(\lambda x.t)\ v \longrightarrow t\,[x \rightsquigarrow v]} \quad \text{STEP\_APP}$$

$$\frac{u \longrightarrow u'}{(\lambda(x :: \sigma).t)\ u \longrightarrow (\lambda(x :: \sigma).t)\ u'} \quad \text{STEP\_ANNOT\_APP2}$$

$$\frac{}{(\lambda(x :: \sigma).t)\ v \longrightarrow t\,[x \rightsquigarrow v]} \quad \text{STEP\_ANNOT\_APP}$$

$$\frac{t \longrightarrow t'}{t :: \sigma \longrightarrow t' :: \sigma} \quad \text{STEP\_ERASE1}$$

$$\frac{}{t :: \sigma \longrightarrow t} \quad \text{STEP\_ERASE}$$

$\boxed{\vdash^{\text{inst}} \sigma \leq \rho}$

$$\frac{\mathsf{lc}\,\rho}{\vdash^{\text{inst}} \rho \leq \rho} \quad \text{INST\_REFL}$$

$$\frac{\vdash^{\text{inst}} [a \mapsto \tau]\,\sigma \leq \rho}{\vdash^{\text{inst}} \forall a.\sigma \leq \rho} \quad \text{INST\_POLY}$$

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Definition rules:        19 good    0 bad
Definition rule clauses: 37 good    0 bad
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