α	type variables			
x	variables			
i	integer literals			
$\tau,\ \sigma$	$::=$			types
	$\mid$	α		
	$\mid$	$\mathbb{Z}$		
	$\mid$	$\texttt{void}$		
	$\mid$	$\tau_1 \to \tau_2$		
	$\mid$	$\forall\,\alpha.\tau$	bind α in τ	
	$\mid$	$\tau_1 \times \tau_2$		
	$\mid$	(τ)	S	
e	$::=$			annotated terms
	$\mid$	u^{τ}		
u	$::=$			raw terms
	$\mid$	x		
	$\mid$	i		
	$\mid$	$\lambda(x:\tau).e$	bind x in e	
	$\mid$	$e_1\ e_2$		
	$\mid$	$e_1 \times e_2$		
	$\mid$	$e\ \cdot \texttt{l}$		
	$\mid$	$e\ \cdot \texttt{r}$		
	$\mid$	$e_1\ p\ e_2$		
	$\mid$	$\mathsf{if0}(e_1, e_2, e_3)$		
	$\mid$	$\mathsf{let}\ x = e\ \mathsf{in}\ u$	bind x in u	
	$\mid$	$\mathsf{halt}\ e$		
	$\mid$	(u)	S	
p	$::=$			primitives
	$\mid$	$+$		
	$\mid$	$-$		
Δ	$::=$			type contexts
	$\mid$			
	$\mid$	Δ, α		
Γ	$::=$			value contexts
	$\mid$			
	$\mid$	$\Gamma, x:\tau$		

$\boxed{\Delta \vdash_{\mathrm{F}} \tau}$ type formation

$$\frac{\alpha \in \Delta}{\Delta \vdash_{\mathrm{F}} \alpha}\quad \textsc{F\_type\_var}$$

$$\frac{}{\Delta \vdash_{\mathrm{F}} \mathbb{Z}}\quad \textsc{F\_type\_int}$$

$$\frac{\begin{array}{c}\Delta \vdash_{\mathrm{F}} \tau_1\\ \Delta \vdash_{\mathrm{F}} \tau_2\end{array}}{\Delta \vdash_{\mathrm{F}} \tau_1 \to \tau_2}\quad \textsc{F\_type\_arr}$$

$$\frac{\Delta, \alpha \vdash_{\mathrm{F}} \tau}{\Delta \vdash_{\mathrm{F}} \forall \alpha . \tau} \quad \text{F\_TYPE\_ALL}$$

$$\frac{\begin{array}{c}\Delta \vdash_{\mathrm{F}} \tau_1 \\ \Delta \vdash_{\mathrm{F}} \tau_2\end{array}}{\Delta \vdash_{\mathrm{F}} \tau_1 \times \tau_2} \quad \text{F\_TYPE\_PROD}$$

$\boxed{\Delta; \Gamma \vdash_{\mathrm{F}} e : \tau}$ annotated typing

$$\frac{\Delta; \Gamma \vdash_{\mathrm{F}} u : \tau}{\Delta; \Gamma \vdash_{\mathrm{F}} u^{\tau} : \tau} \quad \text{F\_ANT\_ANN}$$

$\boxed{\Delta; \Gamma \vdash_{\mathrm{F}} u : \tau}$ typing

$$\frac{\begin{array}{c}\Delta \vdash_{\mathrm{F}} \tau \\ \Gamma(x) = \tau\end{array}}{\Delta; \Gamma \vdash_{\mathrm{F}} x : \tau} \quad \text{F\_TERM\_VAR}$$

$$\frac{}{\Delta; \Gamma \vdash_{\mathrm{F}} i : \mathbb{Z}} \quad \text{F\_TERM\_INT}$$

$$\frac{\begin{array}{l}\Delta \vdash_{\mathrm{F}} \tau_1 \\ \Delta; \Gamma, x_1 : \tau_1 \vdash_{\mathrm{F}} e : \tau_2\end{array}}{\Delta; \Gamma \vdash_{\mathrm{F}} \lambda(x_1 : \tau_1). e : \tau_1 \rightarrow \tau_2} \quad \text{F\_TERM\_LAM}$$

$$\frac{\begin{array}{l}\Delta; \Gamma \vdash_{\mathrm{F}} e_1 : \tau_1 \rightarrow \tau_2 \\ \Delta; \Gamma \vdash_{\mathrm{F}} e_2 : \tau_1\end{array}}{\Delta; \Gamma \vdash_{\mathrm{F}} e_1\ e_2 : \tau_2} \quad \text{F\_TERM\_APP}$$

$$\frac{\begin{array}{c}\Delta; \Gamma \vdash_{\mathrm{F}} e_1 : \tau_1 \\ \Delta; \Gamma \vdash_{\mathrm{F}} e_2 : \tau_2\end{array}}{\Delta; \Gamma \vdash_{\mathrm{F}} e_1 \times e_2 : \tau_1 \times \tau_2} \quad \text{F\_TERM\_PAIR}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{F}} e : \tau_1 \times \tau_2}{\Delta; \Gamma \vdash_{\mathrm{F}} e \cdot \mathtt{l} : \tau_1} \quad \text{F\_TERM\_PRL}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{F}} e : \tau_1 \times \tau_2}{\Delta; \Gamma \vdash_{\mathrm{F}} e \cdot \mathtt{r} : \tau_2} \quad \text{F\_TERM\_PRR}$$

$$\frac{\begin{array}{c}\Delta; \Gamma \vdash_{\mathrm{F}} e_1 : \mathbb{Z} \\ \Delta; \Gamma \vdash_{\mathrm{F}} e_2 : \mathbb{Z}\end{array}}{\Delta; \Gamma \vdash_{\mathrm{F}} e_1\, p\, e_2 : \mathbb{Z}} \quad \text{F\_TERM\_PRIM}$$

$$\frac{\begin{array}{c}\Delta; \Gamma \vdash_{\mathrm{F}} e_1 : \mathbb{Z} \\ \Delta; \Gamma \vdash_{\mathrm{F}} e_2 : \tau \\ \Delta; \Gamma \vdash_{\mathrm{F}} e_3 : \tau\end{array}}{\Delta; \Gamma \vdash_{\mathrm{F}} \mathsf{if0}(e_1, e_2, e_3) : \tau} \quad \text{F\_TERM\_IF0}$$

$\boxed{\Delta \vdash_{\mathrm{K}} \tau}$ type formation

$$\frac{\alpha \in \Delta}{\Delta \vdash_{\mathrm{K}} \alpha} \quad \text{K\_TYPE\_VAR}$$

$$\frac{}{\Delta \vdash_{\mathrm{K}} \mathbb{Z}} \quad \text{K\_TYPE\_INT}$$

$$\frac{\Delta \vdash_{\mathrm{K}} \tau}{\Delta \vdash_{\mathrm{K}} \tau \rightarrow \mathtt{void}} \quad \text{K\_TYPE\_ARR}$$

$$\frac{\Delta \vdash_{\mathrm{K}} \tau_1 \quad \Delta \vdash_{\mathrm{K}} \tau_2}{\Delta \vdash_{\mathrm{K}} \tau_1 \times \tau_2} \quad \text{K\_TYPE\_PROD}$$

$\boxed{\Delta; \Gamma \vdash_{\mathrm{K}} e : \tau}$ annotated typing

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} u : \tau}{\Delta; \Gamma \vdash_{\mathrm{K}} u^{\tau} : \tau} \quad \text{K\_ANT\_ANN}$$

$\boxed{\Delta; \Gamma \vdash_{\mathrm{K}} u : \tau}$ typing

$$\frac{\Delta \vdash_{\mathrm{K}} \tau \quad \Gamma(x) = \tau}{\Delta; \Gamma \vdash_{\mathrm{K}} x : \tau} \quad \text{K\_TERM\_VAR}$$

$$\frac{}{\Delta; \Gamma \vdash_{\mathrm{K}} i : \mathbb{Z}} \quad \text{K\_TERM\_INT}$$

$$\frac{\Delta; \Gamma, x : \tau \vdash_{\mathrm{K}} e : \texttt{void}}{\Delta; \Gamma \vdash_{\mathrm{K}} \lambda(x : \tau).e : \tau \to \texttt{void}} \quad \text{K\_TERM\_LAM}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e_1 : \tau_1 \quad \Delta; \Gamma \vdash_{\mathrm{K}} e_2 : \tau_2}{\Delta; \Gamma \vdash_{\mathrm{K}} e_1 \times e_2 : \tau_1 \times \tau_2} \quad \text{K\_TERM\_PAIR}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e : \tau \quad \Delta; \Gamma, x : \tau \vdash_{\mathrm{K}} u : \texttt{void}}{\Delta; \Gamma \vdash_{\mathrm{K}} \mathsf{let}\, x = e \,\mathsf{in}\, u : \texttt{void}} \quad \text{K\_TERM\_LET}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e : \tau_1 \times \tau_2}{\Delta; \Gamma \vdash_{\mathrm{K}} e \cdot \texttt{l} : \tau_1} \quad \text{K\_TERM\_PRL}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e : \tau_1 \times \tau_2}{\Delta; \Gamma \vdash_{\mathrm{K}} e \cdot \texttt{r} : \tau_2} \quad \text{K\_TERM\_PRR}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e_1 : \mathbb{Z} \quad \Delta; \Gamma \vdash_{\mathrm{K}} e_2 : \mathbb{Z}}{\Delta; \Gamma \vdash_{\mathrm{K}} e_1\, p\, e_2 : \mathbb{Z}} \quad \text{K\_TERM\_PRIM}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e' : \tau \to \texttt{void} \quad \Delta; \Gamma \vdash_{\mathrm{K}} e : \tau}{\Delta; \Gamma \vdash_{\mathrm{K}} e'\, e : \texttt{void}} \quad \text{K\_TERM\_APP}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e : \mathbb{Z} \quad \Delta; \Gamma \vdash_{\mathrm{K}} e_1 : \texttt{void} \quad \Delta; \Gamma \vdash_{\mathrm{K}} e_2 : \texttt{void}}{\Delta; \Gamma \vdash_{\mathrm{K}} \mathsf{if0}(e, e_1, e_2) : \texttt{void}} \quad \text{K\_TERM\_IF0}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{K}} e : \tau}{\Delta; \Gamma \vdash_{\mathrm{K}} \mathsf{halt}\, e : \texttt{void}} \quad \text{K\_TERM\_HALT}$$

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Definition rules:        31 good    0 bad
Definition rule clauses: 75 good    0 bad
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