α	type variables		
x	variables		
i	integer literals		
$\tau,\ \sigma$	$::=$		types
	$\mid\ \alpha$		
	$\mid\ \mathbb{Z}$		
	$\mid\ \texttt{void}$		
	$\mid\ \tau_1 \to \tau_2$		
	$\mid\ \forall\, \alpha.\tau$	bind α in τ	
	$\mid\ \tau_1 \times \tau_2$		
	$\mid\ (\tau)$	S	
v	$::=$		annotated values
	$\mid\ u^{\tau}$		
u	$::=$		values
	$\mid\ x$		
	$\mid\ i$		
	$\mid\ \lambda(x:\tau).v$	bind x in v	
	$\mid\ \lambda(x:\tau).e$	bind x in e	
	$\mid\ v_1\ v_2$		
	$\mid\ v_1 \times v_2$		
	$\mid\ v\ \cdot\texttt{l}$		
	$\mid\ v\ \cdot\texttt{r}$		
	$\mid\ v_1\ p\ v_2$		
	$\mid\ \mathsf{if0}(v_1, v_2, v_3)$		
	$\mid\ (u)$	S	
p	$::=$		primitives
	$\mid\ +$		
	$\mid\ -$		
d	$::=$		declarations
	$\mid\ v$		
	$\mid\ v\ \cdot\texttt{l}$		
	$\mid\ v\ \cdot\texttt{r}$		
	$\mid\ v_1\ p\ v_2$		
e	$::=$		terms
	$\mid\ \mathsf{let}\, x = d\, \mathsf{in}\, e$	bind x in e	
	$\mid\ v'(v)$		
	$\mid\ \mathsf{if0}(v, e_1, e_2)$		
	$\mid\ \mathsf{halt}\, [\tau] v$		
Δ	$::=$		type contexts
	$\mid$		
	$\mid\ \Delta, \alpha$		
Γ	$::=$		value contexts
	$\mid$		

$\mid \quad \Gamma, x : \tau$

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

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

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

$$\frac{\Delta \vdash_{\mathrm{F}} \tau_1 \quad \Delta \vdash_{\mathrm{F}} \tau_2}{\Delta \vdash_{\mathrm{F}} \tau_1 \to \tau_2} \quad \text{F\_TYPE\_ARR}$$

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

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

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

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

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

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

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

$$\frac{\Delta \vdash_{\mathrm{F}} \tau_1 \quad \Delta; \Gamma, x_1 : \tau_1 \vdash_{\mathrm{F}} v : \tau_2}{\Delta; \Gamma \vdash_{\mathrm{F}} \lambda(x_1 : \tau_1).v : \tau_1 \to \tau_2} \quad \text{F\_VALUE\_LAM}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{F}} v_1 : \tau_1 \to \tau_2 \quad \Delta; \Gamma \vdash_{\mathrm{F}} v_2 : \tau_1}{\Delta; \Gamma \vdash_{\mathrm{F}} v_1\, v_2 : \tau_2} \quad \text{F\_VALUE\_APP}$$

$$\frac{\Delta; \Gamma \vdash_{\mathrm{F}} v_1 : \tau_1 \quad \Delta; \Gamma \vdash_{\mathrm{F}} v_2 : \tau_2}{\Delta; \Gamma \vdash_{\mathrm{F}} v_1 \times v_2 : \tau_1 \times \tau_2} \quad \text{F\_VALUE\_PAIR}$$

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

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

$$\frac{\Delta; \Gamma \vdash_{\mathrm{F}} v_1 : \mathbb{Z} \quad \Delta; \Gamma \vdash_{\mathrm{F}} v_2 : \mathbb{Z}}{\Delta; \Gamma \vdash_{\mathrm{F}} v_1\, p\, v_2 : \mathbb{Z}} \quad \text{F\_VALUE\_PRIM}$$

$$\frac{\Delta;\Gamma \vdash_{\mathrm{F}} v_1 : \mathbb{Z} \quad \Delta;\Gamma \vdash_{\mathrm{F}} v_2 : \tau \quad \Delta;\Gamma \vdash_{\mathrm{F}} v_3 : \tau}{\Delta;\Gamma \vdash_{\mathrm{F}} \mathsf{if0}(v_1, v_2, v_3) : \tau}\ \textsc{F\_value\_if0}$$

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

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

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

$$\frac{\Delta \vdash_{\mathrm{K}} \tau}{\Delta \vdash_{\mathrm{K}} \tau \to \mathtt{void}}\ \textsc{K\_type\_arr}$$

$$\frac{\Delta \vdash_{\mathrm{K}} \tau_1 \quad \Delta \vdash_{\mathrm{K}} \tau_2}{\Delta \vdash_{\mathrm{K}} \tau_1 \times \tau_2}\ \textsc{K\_type\_prod}$$

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

$$\frac{\Delta;\Gamma \vdash_{\mathrm{K}} u : \tau}{\Delta;\Gamma \vdash_{\mathrm{K}} u^{\tau} : \tau}\ \textsc{K\_anv\_ann}$$

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

$$\frac{\Delta \vdash_{\mathrm{K}} \tau \quad \Gamma(x) = \tau}{\Delta;\Gamma \vdash_{\mathrm{K}} x : \tau}\ \textsc{K\_value\_var}$$

$$\frac{}{\Delta;\Gamma \vdash_{\mathrm{K}} i : \mathbb{Z}}\ \textsc{K\_value\_int}$$

$$\frac{\Delta;\Gamma, x : \tau \vdash_{\mathrm{K}} e}{\Delta;\Gamma \vdash_{\mathrm{K}} \lambda(x : \tau).e : \tau \to \mathtt{void}}\ \textsc{K\_value\_Lam}$$

$$\frac{\Delta;\Gamma \vdash_{\mathrm{K}} v_1 : \tau_1 \quad \Delta;\Gamma \vdash_{\mathrm{K}} v_2 : \tau_2}{\Delta;\Gamma \vdash_{\mathrm{K}} v_1 \times v_2 : \tau_1 \times \tau_2}\ \textsc{K\_value\_pair}$$

$\boxed{\Delta;\Gamma \vdash_{\mathrm{K}} e}$ term formation

$$\frac{\Delta;\Gamma \vdash_{\mathrm{K}} v : \tau \quad \Delta;\Gamma, x : \tau \vdash_{\mathrm{K}} e}{\Delta;\Gamma \vdash_{\mathrm{K}} \mathsf{let}\, x = v\, \mathsf{in}\, e}\ \textsc{K\_term\_let}$$

$$\frac{\Delta;\Gamma \vdash_{\mathrm{K}} v : \tau_1 \times \tau_2 \quad \Delta;\Gamma, x : \tau_1 \vdash_{\mathrm{K}} e}{\Delta;\Gamma \vdash_{\mathrm{K}} \mathsf{let}\, x = v \cdot \mathtt{l}\, \mathsf{in}\, e}\ \textsc{K\_term\_prl}$$

$$\frac{\Delta;\Gamma \vdash_{\mathrm{K}} v : \tau_1 \times \tau_2 \quad \Delta;\Gamma, x : \tau_2 \vdash_{\mathrm{K}} e}{\Delta;\Gamma \vdash_{\mathrm{K}} \mathsf{let}\, x = v \cdot \mathtt{r}\, \mathsf{in}\, e}\ \textsc{K\_term\_prr}$$

$$\frac{\Delta;\Gamma \vdash_{\mathrm{K}} v_1 : \mathbb{Z} \quad \Delta;\Gamma \vdash_{\mathrm{K}} v_2 : \mathbb{Z} \quad \Delta;\Gamma, x : \mathbb{Z} \vdash_{\mathrm{K}} e}{\Delta;\Gamma \vdash_{\mathrm{K}} \mathsf{let}\, x = v_1\, p\, v_2\, \mathsf{in}\, e}\ \textsc{K\_term\_prim}$$

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

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

$$\frac{\Delta;\Gamma \vdash_{\mathrm{K}} v : \tau}{\Delta;\Gamma \vdash_{\mathrm{K}} \mathsf{halt}\,[\tau]v} \ \text{K\_TERM\_HALT}$$

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Definition rules:         31 good    0 bad
Definition rule clauses: 78 good    0 bad
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