α type variables
x variables
i integer literals

τ ::=   types
    | α
    | $\mathbb{Z}$
    | $\tau_1 \to \tau_2$
    | $\forall\,\alpha.\tau$ bind α in τ
    | $\tau_1 \times \tau_2$
    | (τ) S

$u,\ e$ ::=   terms
    | x
    | i
    | $\mathsf{fix}\,x(x_1 : \tau_1) : \tau_2.e$
    | $e_1\ e_2$
    | $\Lambda\alpha.e$ bind α in e
    | $e[\tau]$
    | $e_1 \times e_2$
    | $e \cdot \mathtt{l}$
    | $e \cdot \mathtt{r}$
    | $e_1\ p\ e_2$
    | $\mathsf{if0}(e_1, e_2, e_3)$
    | (u) S
    | u^τ annotated terms

p ::=   primitives
    | $+$
    | $-$

Δ ::=   type contexts
    |
    | Δ, α

Γ ::=   value contexts
    |
    | $\Gamma, x : \tau$

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

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

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

$$\frac{\Delta \vdash_{\mathrm{F}} \tau_1 \quad \Delta \vdash_{\mathrm{F}} \tau_2}{\Delta \vdash_{\mathrm{F}} \tau_1 \to \tau_2} \quad \textsc{type\_arr}$$

$$\frac{\Delta, \alpha \vdash_{\mathrm{F}} \tau}{\Delta \vdash_{\mathrm{F}} \forall\,\alpha.\tau} \quad \textsc{type\_all}$$

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

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

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

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

$$\frac{\Delta \vdash_{\mathrm{F}} \tau_1 \quad \Delta \vdash_{\mathrm{F}} \tau_2 \quad \Delta;\Gamma, x : \tau_1 \to \tau_2, x_1 : \tau_1 \vdash_{\mathrm{F}} u : \tau_2}{\Delta;\Gamma \vdash_{\mathrm{F}} \mathsf{fix}\, x(x_1 : \tau_1) : \tau_2.u : \tau_1 \to \tau_2} \quad \text{TERM\_FIX}$$

$$\frac{\Delta;\Gamma \vdash_{\mathrm{F}} e_1 : \tau_1 \to \tau_2 \quad \Delta;\Gamma \vdash_{\mathrm{F}} e_2 : \tau_1}{\Delta;\Gamma \vdash_{\mathrm{F}} e_1\, e_2 : \tau_2} \quad \text{TERM\_APP}$$

$$\frac{\Delta,\alpha;\Gamma \vdash_{\mathrm{F}} e : \tau}{\Delta;\Gamma \vdash_{\mathrm{F}} \Lambda\alpha.e : \forall\,\alpha.\tau} \quad \text{TERM\_TLAM}$$

$$\frac{\Delta \vdash_{\mathrm{F}} \tau \quad \Delta;\Gamma \vdash_{\mathrm{F}} e : \forall\,\alpha.\tau'}{\Delta;\Gamma \vdash_{\mathrm{F}} e[\tau] : \tau'[\tau/\alpha]} \quad \text{TERM\_TAPP}$$

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

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

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

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

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

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Definition rules:         16 good     0 bad
Definition rule clauses:  40 good     0 bad
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