x	term variable			
α	type variable			
T	abstract type			
t	$::=$			term
	$\vert$	x		variable
	$\vert$	$\lambda(x : \tau) \Rightarrow t$		abstraction
	$\vert$	$\lambda\{\alpha : \kappa\} \Rightarrow t$		type abstraction
	$\vert$	$t_1\, t_2$		application
	$\vert$	$t\ [\tau]$		type application
	$\vert$	$t : \tau$		type annotation
	$\vert$	(t)	S	parenthesis
v	$::=$			value
	$\vert$	$\lambda(x : \tau) \Rightarrow t$		abstraction
κ	$::=$			kind
	$\vert$	$*$		star
	$\vert$	$\kappa_1 \to \kappa_2$		kind arrow
	$\vert$	(κ)	S	parenthesis
τ	$::=$			type
	$\vert$	α		type variable
	$\vert$	T		abstract type
	$\vert$	$\tau_1 \to \tau_2$	S	$\equiv (\to)\ \tau_1\ \tau_2$ where $(\to) : * \to * \to *$
	$\vert$	$\lambda(\alpha : \kappa), \tau$		operator abstraction
	$\vert$	$\forall\,(\alpha : \kappa), \tau$		universal quantification
	$\vert$	$\tau_1\, \tau_2$		operator application
	$\vert$	(τ)	S	parenthesis
Γ	$::=$			typing environment
	$\vert$	$\emptyset$		empty
	$\vert$	$\Gamma, x : \tau$		variable
	$\vert$	$\Gamma, T : \kappa$		abstract type
	$\vert$	$\Gamma, \alpha : \kappa$		type variable

$\boxed{[\alpha \mapsto \tau_1]\tau_2 \rhd \tau_3}$ Type substitution

$$\frac{}{[\alpha \mapsto \tau]\alpha \rhd \tau}\ \textsc{SubstT\_Var1}$$

$$\frac{}{[\alpha_1 \mapsto \tau]\alpha_2 \rhd \alpha_2}\ \textsc{SubstT\_Var2}$$

$$\frac{}{[\alpha \mapsto \tau]T \rhd T}\ \textsc{SubstT\_Type}$$

$$\frac{}{[\alpha \mapsto \tau_1]\lambda(\alpha : \kappa), \tau_2 \rhd \lambda(\alpha : \kappa), \tau_2}\ \textsc{SubstT\_Abs1}$$

$$\frac{[\alpha_1 \mapsto \tau_1]\tau_2 \rhd \tau_2'}{[\alpha_1 \mapsto \tau_1]\lambda(\alpha_2 : \kappa), \tau_2 \rhd \lambda(\alpha_2 : \kappa), \tau_2'}\ \textsc{SubstT\_Abs2}$$

$$\frac{}{[\alpha \mapsto \tau_1]\forall\,(\alpha : \kappa), \tau_2 \rhd \forall\,(\alpha : \kappa), \tau_2}\ \textsc{SubstT\_Forall1}$$

$$\frac{[\alpha_1 \mapsto \tau_1]\tau_2 \rhd \tau_2'}{[\alpha_1 \mapsto \tau_1]\forall\,(\alpha_2 : \kappa), \tau_2 \rhd \forall\,(\alpha_2 : \kappa), \tau_2'}\ \textsc{SubstT\_Forall2}$$

$$\frac{[\alpha \mapsto \tau_1]\tau_2 \rhd \tau_2' \quad [\alpha \mapsto \tau_1]\tau_3 \rhd \tau_3'}{[\alpha \mapsto \tau_1]\tau_2\,\tau_3 \rhd \tau_2'\,\tau_3'} \quad \text{SubstT\_App}$$

$\boxed{\Gamma \vdash t : \tau}$ Typing rules

$$\frac{x : \tau \in \Gamma}{\Gamma \vdash x : \tau} \quad \text{T\_Var}$$

$$\frac{\Gamma, x : \tau_1 \vdash t : \tau_2 \quad \Gamma \vdash \tau_1 : *}{\Gamma \vdash \lambda(x : \tau_1) \Rightarrow t : \tau_1 \to \tau_2} \quad \text{T\_Abs}$$

$$\frac{\Gamma, \alpha : \kappa \vdash t : \tau \quad \alpha \notin \Gamma}{\Gamma \vdash \lambda\{\alpha : \kappa\} \Rightarrow t : \forall\,(\alpha : \kappa), \tau} \quad \text{T\_TyAbs}$$

$$\frac{\Gamma \vdash t_1 : \tau_2 \to \tau_1 \quad \tau_2 \equiv \tau_2' \quad \Gamma \vdash t_2 : \tau_2'}{\Gamma \vdash t_1\, t_2 : \tau_1} \quad \text{T\_App}$$

$$\frac{\Gamma \vdash t : \forall\,(\alpha : \kappa), \tau_2 \quad \Gamma \vdash \tau_1 : \kappa \quad [\alpha \mapsto \tau_1]\tau_2 \rhd \tau_2'}{\Gamma \vdash t\ [\tau_1] : \tau_2'} \quad \text{T\_TyApp}$$

$$\frac{\Gamma \vdash t : \tau_2 \quad \tau_1 \equiv \tau_2}{\Gamma \vdash (t : \tau_1) : \tau_1} \quad \text{T\_Annot}$$

$\boxed{\Gamma \vdash \tau : \kappa}$ Kinding

$$\frac{\alpha : \kappa \in \Gamma}{\Gamma \vdash \alpha : \kappa} \quad \text{K\_Var}$$

$$\frac{T : \kappa \in \Gamma}{\Gamma \vdash T : \kappa} \quad \text{K\_AbsType}$$

$$\frac{\Gamma, \alpha : \kappa_1 \vdash \tau : \kappa_2}{\Gamma \vdash \lambda(\alpha : \kappa_1), \tau : \kappa_1 \to \kappa_2} \quad \text{K\_Abs}$$

$$\frac{\Gamma \vdash \tau_1 : \kappa_2 \to \kappa_1 \quad \Gamma \vdash \tau_2 : \kappa_2}{\Gamma \vdash \tau_1\,\tau_2 : \kappa_1} \quad \text{K\_App}$$

$$\frac{\Gamma, \alpha : \kappa \vdash \tau : *}{\Gamma \vdash \forall\,(\alpha : \kappa), \tau : *} \quad \text{K\_Forall}$$

$\boxed{\tau_1 \equiv \tau_2}$ Type equivalence

$$\frac{}{\tau \equiv \tau} \quad \text{EQ\_Refl}$$

$$\frac{\tau_2 \equiv \tau_1}{\tau_1 \equiv \tau_2} \quad \text{EQ\_Symm}$$

$$\frac{\tau_1 \equiv \tau_2 \quad \tau_2 \equiv \tau_3}{\tau_1 \equiv \tau_3} \quad \text{EQ\_Trans}$$

$$\frac{}{\alpha \equiv \alpha} \quad \text{EQ\_VAR}$$

$$\frac{}{T \equiv T} \quad \text{EQ\_ABSTYPE}$$

$$\frac{\tau_1 \equiv \tau_2}{\forall\,(\alpha : \kappa), \tau_1 \equiv \forall\,(\alpha : \kappa), \tau_2} \quad \text{EQ\_FORALL}$$

$$\frac{\tau_1 \equiv \tau_2}{\lambda(\alpha : \kappa), \tau_1 \equiv \lambda(\alpha : \kappa), \tau_2} \quad \text{EQ\_ABS}$$

$$\frac{\begin{array}{c}\tau_1 \equiv \tau_1' \\ \tau_2 \equiv \tau_2'\end{array}}{\tau_1\ \tau_2 \equiv \tau_1'\ \tau_2'} \quad \text{EQ\_APP}$$

$$\frac{[\alpha \mapsto \tau_2]\tau_1 \rhd \tau_1'}{(\lambda(\alpha : \kappa), \tau_1)\ \tau_2 \equiv \tau_1'} \quad \text{EQ\_APPABS}$$

$\boxed{[x \mapsto v]t_1 \rhd t_2}$ substitution

$$\frac{}{[x \mapsto v]x \rhd v} \quad \text{SUBST\_VAR1}$$

$$\frac{}{[x_1 \mapsto v]x_2 \rhd x_2} \quad \text{SUBST\_VAR2}$$

$$\frac{}{[x \mapsto v]\lambda(x : \tau) \Rightarrow t \rhd \lambda(x : \tau) \Rightarrow t} \quad \text{SUBST\_ABS1}$$

$$\frac{[x_1 \mapsto v]t_1 \rhd t_2}{[x_1 \mapsto v]\lambda(x_2 : \tau) \Rightarrow t_1 \rhd \lambda(x_2 : \tau) \Rightarrow t_2} \quad \text{SUBST\_ABS2}$$

$$\frac{[x \mapsto v]t_1 \rhd t_2}{[x \mapsto v]\lambda\{\alpha : \kappa\} \Rightarrow t_1 \rhd \lambda\{\alpha : \kappa\} \Rightarrow t_2} \quad \text{SUBST\_TABS}$$

$$\frac{\begin{array}{c}[x \mapsto v]t_1 \rhd t_1' \\ [x \mapsto v]t_2 \rhd t_2'\end{array}}{[x \mapsto v]t_1\ t_2 \rhd t_1'\ t_2'} \quad \text{SUBST\_APP}$$

$$\frac{[x \mapsto v]t_1 \rhd t_2}{[x \mapsto v]t_1\ [\tau] \rhd t_2\ [\tau]} \quad \text{SUBST\_TAPP}$$

$$\frac{[x \mapsto v]t_1 \rhd t_2}{[x \mapsto v]t_1 : \tau \rhd t_2 : \tau} \quad \text{SUBST\_ANNOT}$$

$\boxed{t_1 \longrightarrow t_2}$ Evaluation

$$\frac{t_2 \longrightarrow t_2'}{t_1\ t_2 \longrightarrow t_1\ t_2'} \quad \text{E\_APP1}$$

$$\frac{t_1 \longrightarrow t_1'}{t_1\ v \longrightarrow t_1'\ v} \quad \text{E\_APP2}$$

$$\frac{\begin{array}{c}[x \mapsto v]t \rhd t' \\ t' \longrightarrow t''\end{array}}{(\lambda(x : \tau) \Rightarrow t)\ v \longrightarrow t''} \quad \text{E\_APPABS}$$

$$\frac{t \longrightarrow t'}{\lambda\{\alpha : \kappa\} \Rightarrow t \longrightarrow t'} \quad \text{E\_TABS}$$

$$\frac{t \longrightarrow t'}{t\ [\tau] \longrightarrow t'} \quad \text{E\_TAPP}$$

$$\frac{t \longrightarrow t'}{t : \tau \longrightarrow t'} \quad \text{E\_ANNOT}$$

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Definition rules:         42 good    0 bad
Definition rule clauses: 86 good    0 bad
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