$tmvar,\ x,\ y$	variables			
$label,\ l$				
$index,\ i,\ n$				
$typ,\ \tau$	$::=$			types
	$\mid$	$\mathbf{nat}$		Natural numbers
	$\mid$	$\tau_1 \to \tau_2$		Function types
	$\mid$	$\mathbf{unit}$		Unit type
	$\mid$	$\tau_1 \times \tau_2$		Product types
	$\mid$	$\mathbf{void}$		Void types
	$\mid$	$\tau_1 + \tau_2$		Sum types
$exp,\ e$	$::=$			expressions
	$\mid$	x		Variables
	$\mid$	$\mathbf{z}$		Zero
	$\mid$	$\mathbf{s}\, e$		Successor
	$\mid$	$\mathbf{rec}\, e\{\mathbf{z} \to e_0; \mathbf{s}\, x \to e_1\}$	bind x in e_1	Primitive recursion over nats
	$\mid$	$\lambda(x : \tau)e$	bind x in e	Functions
	$\mid$	$e_1\ e_2$		Application
	$\mid$	(e)	M	
	$\mid$	$e_1\{e_2/x\}$	M	
	$\mid$	$\mathbf{triv}$		Null tuple
	$\mid$	$< e_1; e_2 >$		Ordered pair
	$\mid$	$\mathbf{fst}\, e$		Left projection
	$\mid$	$\mathbf{snd}\, e$		Right projection
	$\mid$	$\mathbf{abort}\,\{\tau\}(e)$		Abort
	$\mid$	$\mathbf{inl}\,\{\tau\}(e)$		Left injection
	$\mid$	$\mathbf{inr}\,\{\tau\}(e)$		Right injection
	$\mid$	$\mathbf{case}\, e\{\mathbf{inl}\, x_1 \to e_1 \mid \mathbf{inr}\, x_2 \to e_2\}$	bind x_1 in e_1 bind x_2 in e_2	Case analysis
$env,\ \Gamma$	$::=$			typing environment
	$\mid$	$\emptyset$		empty
	$\mid$	$\Gamma, x : \tau$		cons
	$\mid$	$\Gamma +\!+ \Gamma'$	M	
$terminals$	$::=$			
	$\mid$	λ		
	$\mid$	$\rightsquigarrow$		
	$\mid$	$\vdash$		
	$\mid$	$\to$		
	$\mid$	$+\!+$		
	$\mid$	$\emptyset$		
	$\mid$	$\times$		
	$\mid$	$+$		
$formula$	$::=$			
	$\mid$	$judgement$		
	$\mid$	$x : \tau\ \mathbf{in}\ \Gamma$		
	$\mid$	$(formula)$		
	$\mid$	$\mathbf{uniq}\, \Gamma$		

	$\vert$	$formula_1 \quad .. \quad formula_n$
$JValue$	::=	
	$\vert$	$e\ \mathbf{val}$
$JTyping$	::=	
	$\vert$	$\Gamma \vdash e : \tau$
$JDyn$	::=	
	$\vert$	$e \rightsquigarrow e'$
$judgement$	::=	
	$\vert$	$JValue$
	$\vert$	$JTyping$
	$\vert$	$JDyn$
$user\_syntax$	::=	
	$\vert$	$tmvar$
	$\vert$	$label$
	$\vert$	$index$
	$\vert$	typ
	$\vert$	exp
	$\vert$	env
	$\vert$	$terminals$
	$\vert$	$formula$

$\boxed{e\ \mathbf{val}}$

$$\frac{}{\mathbf{z}\ \mathbf{val}} \quad \text{VAL\_Z}$$

$$\frac{e\ \mathbf{val}}{\mathbf{s}\ e\ \mathbf{val}} \quad \text{VAL\_S}$$

$$\frac{}{\lambda(x:\tau)e\ \mathbf{val}} \quad \text{VAL\_ABS}$$

$$\frac{}{\mathbf{triv}\ \mathbf{val}} \quad \text{VAL\_NULL}$$

$$\frac{\begin{array}{c} e_1\ \mathbf{val} \\ e_2\ \mathbf{val} \end{array}}{< e_1; e_2 >\ \mathbf{val}} \quad \text{VAL\_PROD}$$

$$\frac{e\ \mathbf{val}}{\mathbf{inl}\ \{\tau\}(e)\ \mathbf{val}} \quad \text{VAL\_INL}$$

$$\frac{e\ \mathbf{val}}{\mathbf{inr}\ \{\tau\}(e)\ \mathbf{val}} \quad \text{VAL\_INR}$$

$\boxed{\Gamma \vdash e : \tau}$

$$\frac{\begin{array}{c} \mathbf{uniq}\,\Gamma \\ x : \tau\ \mathbf{in}\,\Gamma \end{array}}{\Gamma \vdash x : \tau} \quad \text{TYPING\_VAR}$$

$$\frac{\mathbf{uniq}\,\Gamma}{\Gamma \vdash \mathbf{z} : \mathbf{nat}} \quad \text{TYPING\_Z}$$

$$\frac{\Gamma \vdash e : \mathbf{nat}}{\Gamma \vdash \mathbf{s}\, e : \mathbf{nat}} \quad \text{TYPING\_S}$$

$$\frac{\begin{array}{l}\Gamma \vdash e : \mathbf{nat} \\ \Gamma \vdash e_0 : \tau \\ \Gamma, x : \mathbf{nat} \vdash e_1 : \tau \to \tau \\ e_1\, \mathbf{val}\end{array}}{\Gamma \vdash \mathbf{rec}\, e\{\, \mathbf{z} \to e_0;\, \mathbf{s}\, x \to e_1\} : \tau} \quad \text{TYPING\_REC}$$

$$\frac{\Gamma, x : \tau_1 \vdash e : \tau_2}{\Gamma \vdash \lambda(x{:}\tau_1)e : \tau_1 \to \tau_2} \quad \text{TYPING\_ABS}$$

$$\frac{\begin{array}{c}\Gamma \vdash e_1 : \tau_1 \to \tau_2 \\ \Gamma \vdash e_2 : \tau_1\end{array}}{\Gamma \vdash e_1\, e_2 : \tau_2} \quad \text{TYPING\_FAPP}$$

$$\frac{\mathbf{uniq}\, \Gamma}{\Gamma \vdash \mathbf{triv} : \mathbf{unit}} \quad \text{TYPING\_NULL}$$

$$\frac{\begin{array}{c}\Gamma \vdash e_1 : \tau_1 \\ \Gamma \vdash e_2 : \tau_2\end{array}}{\Gamma \vdash < e_1; e_2 >: \tau_1 \times \tau_2} \quad \text{TYPING\_PAIR}$$

$$\frac{\Gamma \vdash e : \tau_1 \times \tau_2}{\Gamma \vdash \mathbf{fst}\, e : \tau_1} \quad \text{TYPING\_FST}$$

$$\frac{\Gamma \vdash e : \tau_1 \times \tau_2}{\Gamma \vdash \mathbf{snd}\, e : \tau_2} \quad \text{TYPING\_SND}$$

$$\frac{\Gamma \vdash e : \mathbf{void}}{\Gamma \vdash \mathbf{abort}\, \{\tau\}(e) : \tau} \quad \text{TYPING\_ABORT}$$

$$\frac{\Gamma \vdash e : \tau_1}{\Gamma \vdash \mathbf{inl}\, \{\tau_2\}(e) : \tau_1 + \tau_2} \quad \text{TYPING\_INL}$$

$$\frac{\Gamma \vdash e : \tau_2}{\Gamma \vdash \mathbf{inr}\, \{\tau_1\}(e) : \tau_1 + \tau_2} \quad \text{TYPING\_INR}$$

$$\frac{\begin{array}{c}\Gamma \vdash e : \tau_1 + \tau_2 \\ \Gamma, x : \tau_1 \vdash e_1 : \tau \\ \Gamma, x : \tau_2 \vdash e_2 : \tau\end{array}}{\Gamma \vdash \mathbf{case}\, e\{\, \mathbf{inl}\, x \to e_1 |\, \mathbf{inr}\, x \to e_2\} : \tau} \quad \text{TYPING\_CASE}$$

$\boxed{e \leadsto e'}$

$$\frac{e \leadsto e'}{\mathbf{s}\, e \leadsto \mathbf{s}\, e'} \quad \text{EVAL\_S}$$

$$\frac{e_1 \leadsto e_1'}{e_1\, e_2 \leadsto e_1'\, e_2} \quad \text{EVAL\_FAPP\_LEFT}$$

$$\frac{\begin{array}{l}e_1\, \mathbf{val} \\ e_2 \leadsto e_2'\end{array}}{e_1\, e_2 \leadsto e_1\, e_2'} \quad \text{EVAL\_FAPP\_RIGHT}$$

$$\frac{e_2\, \mathbf{val}}{(\lambda(x{:}\tau)e_1)\, e_2 \leadsto e_1\{e_2/x\}} \quad \text{EVAL\_BETA}$$

$$\frac{e \rightsquigarrow e'}{\mathbf{rec}\, e\{\, \mathbf{z}\ \rightarrow e_0;\ \mathbf{s}\, x \rightarrow e_1\} \rightsquigarrow \mathbf{rec}\, e'\{\, \mathbf{z}\ \rightarrow e_0;\ \mathbf{s}\, x \rightarrow e_1\}} \quad \text{EVAL\_REC\_SCRUT}$$

$$\frac{}{\mathbf{rec}\, \mathbf{z}\{\, \mathbf{z}\ \rightarrow e_0;\ \mathbf{s}\, x \rightarrow e_1\} \rightsquigarrow e_0} \quad \text{EVAL\_REC\_Z}$$

$$\frac{(\mathbf{s}\, e)\ \mathbf{val}}{\mathbf{rec}\, (\mathbf{s}\, e)\{\, \mathbf{z}\ \rightarrow e_0;\ \mathbf{s}\, x \rightarrow e_1\} \rightsquigarrow e_1\{e/x\}\, (\mathbf{rec}\, e\{\, \mathbf{z}\ \rightarrow e_0;\ \mathbf{s}\, x \rightarrow e_1\})} \quad \text{EVAL\_REC\_S}$$

$$\frac{e_1 \rightsquigarrow e_1'}{< e_1; e_2 > \rightsquigarrow < e_1'; e_2 >} \quad \text{EVAL\_PAIR\_LEFT}$$

$$\frac{\begin{array}{c} e_1\ \mathbf{val} \\ e_2 \rightsquigarrow e_2' \end{array}}{< e_1; e_2 > \rightsquigarrow < e_1; e_2' >} \quad \text{EVAL\_PAIR\_RIGHT}$$

$$\frac{e \rightsquigarrow e'}{\mathbf{fst}\, e \rightsquigarrow \mathbf{fst}\, e'} \quad \text{EVAL\_FST}$$

$$\frac{e \rightsquigarrow e'}{\mathbf{snd}\, e \rightsquigarrow \mathbf{snd}\, e'} \quad \text{EVAL\_SND}$$

$$\frac{\begin{array}{c} e_1\ \mathbf{val} \\ e_2\ \mathbf{val} \end{array}}{\mathbf{fst}\ < e_1; e_2 > \rightsquigarrow e_1} \quad \text{EVAL\_FST\_VAL}$$

$$\frac{\begin{array}{c} e_1\ \mathbf{val} \\ e_2\ \mathbf{val} \end{array}}{\mathbf{snd}\ < e_1; e_2 > \rightsquigarrow e_2} \quad \text{EVAL\_SND\_VAL}$$

$$\frac{e \rightsquigarrow e'}{\mathbf{abort}\, \{\tau\}(e) \rightsquigarrow \mathbf{abort}\, \{\tau\}(e')} \quad \text{EVAL\_ABORT}$$

$$\frac{e \rightsquigarrow e'}{\mathbf{inl}\, \{\tau\}(e) \rightsquigarrow \mathbf{inl}\, \{\tau\}(e')} \quad \text{EVAL\_INL}$$

$$\frac{e \rightsquigarrow e'}{\mathbf{inr}\, \{\tau\}(e) \rightsquigarrow \mathbf{inr}\, \{\tau\}(e')} \quad \text{EVAL\_INR}$$

$$\frac{e \rightsquigarrow e'}{\mathbf{case}\, e\{\, \mathbf{inl}\, x_1 \rightarrow e_1 |\, \mathbf{inr}\, x_2 \rightarrow e_2\} \rightsquigarrow \mathbf{case}\, e'\{\, \mathbf{inl}\, x_1 \rightarrow e_1 |\, \mathbf{inr}\, x_2 \rightarrow e_2\}} \quad \text{EVAL\_CASE}$$

$$\frac{e\ \mathbf{val}}{\mathbf{case}\, \mathbf{inl}\, \{\tau_2\}(e)\{\, \mathbf{inl}\, x_1 \rightarrow e_1 |\, \mathbf{inr}\, x_2 \rightarrow e_2\} \rightsquigarrow e_1\{e/x_1\}} \quad \text{EVAL\_CASEL}$$

$$\frac{e\ \mathbf{val}}{\mathbf{case}\, \mathbf{inr}\, \{\tau_1\}(e)\{\, \mathbf{inl}\, x_1 \rightarrow e_1 |\, \mathbf{inr}\, x_2 \rightarrow e_2\} \rightsquigarrow e_2\{e/x_2\}} \quad \text{EVAL\_CASER}$$

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Definition rules:         40 good    0 bad
Definition rule clauses: 89 good    0 bad
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