termvar, x, f	term variable
typevar, α	type variable
integer, i	integer
s	string
b	boolean
k	index

nat, n	::=		natural numbers
	|	0	zero
	|	$n + 1$	successor

const	::=		constants
	|	**noop**	no-op
	|	**wait**	wait
	|	**selfdestruct**	self destruct
	|	**move**	move
	|	**turn**	turn
	|	**grab**	grab
	|	**place**	place
	|	**give**	give
	|	**install**	install
	|	**make**	make
	|	**has**	inventory test
	|	**count**	inventory count
	|	**drill**	drill
	|	**build**	build
	|	**salvage**	salvage
	|	**reprogram**	reprogram
	|	**say**	say
	|	**log**	log
	|	**view**	view
	|	**appear**	appear
	|	**create**	create
	|	**whereami**	location query
	|	**blocked**	front query
	|	**scan**	scan
	|	**upload**	upload
	|	**ishere**	cell query
	|	**whoami**	self name query
	|	**random**	random
	|	**run**	run
	|	**if**	if
	|	**inl**	left injection
	|	**inr**	right injection
	|	**case**	case analysis
	|	**fst**	first projection
	|	**snd**	second projection
	|	**force**	force
	|	**return**	return
	|	**try**	try
	|	**raise**	raise exception
	|	**not**	not
	|	**neg**	negate
	|	**eq**	equal to
	|	**neq**	not equal to
	|	**lt**	less than
	|	**gt**	greater than

	| **leq**		less-or-equal
	| **geq**		greater-or-equal
	| **add**		addition
	| **sub**		subtraction
	| **mul**		multiplication
	| **div**		division
	| **exp**		exponentiation
d	::=		direction
	| **left**		
	| **right**		
	| **back**		
	| **forward**		
	| **north**		
	| **south**		
	| **east**		
	| **west**		
	| **down**		
term, t	::=		term
	| $()$		unit value
	| *const*		constant
	| d		direction literal
	| i		integer literal
	| s		string literal
	| b		boolean literal
	| x		variable
	| $\lambda x.t$	bind x in t	function abstraction
	| $t_1\ t_2$		function application
	| **let** $x = t_1$ **in** t_2	bind x in t_2	let
	| **def** $x = t$ **end**		definition
	| $x \leftarrow t_1; t_2$	bind x in t_2	bind
	| (t_1, t_2)		pair
	| $\{t\}$		delay
	| (t)	S	
basety, B	::=		base type
	| $()$		unit
	| **int**		integers
	| **string**		strings
	| **dir**		directions
	| **bool**		booleans
type, τ	::=		monotype
	| α		variable
	| B		base type
	| **cmd** τ		command type
	| $\{\tau\}$		delay type
	| $\tau_1 + \tau_2$		sum type
	| $\tau_1 \times \tau_2$		product type

	$\mid$	$\tau_1 \xrightarrow{n;\Delta;\Xi} \tau_2$	function type
	$\mid$	(τ) S	

capability, κ	::=		capability
	$\mid$	GOD	
	$\mid$	BUILD	

capset, K	::=		capability set
	$\mid$	$\bullet$	
	$\mid$	K, κ	
	$\mid$	(K) S	

capstack, Δ, Ξ	::=		capability stack
	$\mid$	$\bullet$	
	$\mid$	$K \triangleright \Delta$	

Γ	::=		type context
	$\mid$	$\bullet$	empty context
	$\mid$	$\Gamma,\ x :^n \tau; \Xi$	

$\boxed{\Gamma \vdash t : \tau; \Delta; \Xi}$ In context Γ, t has type τ and requires evaluation and execution capabilites Δ and Ξ

$$\frac{}{\Gamma \vdash () : (); \bullet; \bullet}\ \text{TYPE\_UNIT}$$

$$\frac{}{\Gamma \vdash d : \mathbf{dir}; \bullet; \bullet}\ \text{TYPE\_DIR}$$

$$\frac{}{\Gamma \vdash i : \mathbf{int}; \bullet; \bullet}\ \text{TYPE\_INT}$$

$$\frac{}{\Gamma \vdash s : \mathbf{string}; \bullet; \bullet}\ \text{TYPE\_STRING}$$

$$\frac{}{\Gamma \vdash b : \mathbf{bool}; \bullet; \bullet}\ \text{TYPE\_BOOL}$$

$$\frac{x :^0 \tau; \Xi \in \Gamma}{\Gamma \vdash x : \tau; \bullet; \Xi}\ \text{TYPE\_VAR}$$

$$\frac{\Gamma,\ x :^n \tau_1; \Xi_1 \vdash t : \tau_2; \Delta_2; \Xi_2}{\Gamma \vdash \lambda x.t : \tau_1 \xrightarrow{n;\Delta_2;\Xi_2} \tau_2; \bullet; \bullet}\ \text{TYPE\_LAM}$$

$$\frac{\Gamma \vdash t_1 : \tau_1 \xrightarrow{n;\Delta_1;\Xi_1} \tau_2; \Delta_2; \Xi_2 \quad \Gamma \vdash t_2 : \tau_1; \Delta_3; \Xi_3}{\Gamma \vdash t_1\ t_2 : \tau_2; \Delta_1 \cup \Delta_2 \cup \Delta_3; \Xi_1 \cup \Xi_2 \cup \{\Xi_3\}^n}\ \text{TYPE\_APP}$$

$$\frac{\Gamma \vdash t_1 : \tau_1; \Delta_1; \Xi_1 \quad \Gamma,\ x :^n \tau_1; \Xi_1 \vdash t_2 : \tau_2; \Delta_2; \Xi_2}{\Gamma \vdash \mathbf{let}\ x = t_1\ \mathbf{in}\ t_2 : \tau_2; \Delta_1 \cup \Delta_2; \{\Xi_1\}^n \cup \Xi_2}\ \text{TYPE\_LET}$$

$$\frac{\Gamma^- \vdash t : \tau; \Delta; \Xi}{\Gamma \vdash \{t\} : \{\tau\}; \bullet \triangleright \Delta; \bullet \triangleright \Xi}\ \text{TYPE\_DELAY}$$

$$\frac{\Gamma \vdash t : \{\tau\}; K_1 \triangleright K_2 \triangleright \Delta; K_3 \triangleright \Xi}{\Gamma^- \vdash \mathbf{force}\ t : \tau; (K_1 \cup K_2) \triangleright \Delta; \Xi}\ \text{TYPE\_FORCE}$$

$$\frac{\Gamma \vdash t_1 : \tau_1; \Delta_1; \Xi_1 \quad \Gamma \vdash t_2 : \tau_2; \Delta_2; \Xi_2}{\Gamma \vdash (t_1, t_2) : \tau_1 \times \tau_2; \Delta_1 \cup \Delta_2; \Xi_1 \cup \Xi_2}\ \text{TYPE\_PAIR}$$

$$\frac{\Gamma \vdash t_1 : \mathbf{cmd}\ \tau_1; \Delta_1; \Xi_1 \quad \Gamma,\ x :^n \tau_1; \Xi \vdash t_2 : \mathbf{cmd}\ \tau_2; \Delta_2; \Xi_2}{\Gamma \vdash x \leftarrow t_1; t_2 : \mathbf{cmd}\ \tau_2; \Delta_1 \cup \Delta_2; \Xi_1 \cup \{\Xi\}^n \cup \Xi_2}\ \text{TYPE\_BIND}$$

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Definition rules:         13 good    0 bad
Definition rule clauses:  21 good    0 bad
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