id	::=			
v	::=			Values
	|	**b**		Boolean
	|	**n**		Number
	|	**str**		String
	|	**undefined**		Undefined
	|	**null**		null
	|	$get(s, id)$	M	GetStore
s	::=			Store
	|	$put(s, id, v)$	M	PutStore
vd	::=			VariableDeclaration
	|	id		Declaration
	|	$id = e$		Definition
	|	vd, vd'		Multiple
e	::=			Expression
	|	v		Value
	|	id		Deref
	|	$id = e$		Ref
m	::=			Statement
	|	e		Expression
	|	ϵ		Skip
	|	$m; m'$		Seq
	|	**var** vd		VarDeclaration
Tv	::=			Value Type
	|	**number**		Number
	|	**boolean**		Boolean
	|	**string**		String
	|	**undefined**		undefined
	|	**null**		null
T	::=			Expression Type
	|	Tv		ValueType
	|	$ref < Tv >$		Location Type
terminals	::=			
	|	$\rightarrow$		
	|	Γ		
	|	$\vdash$		
	|	;		
	|	**var**		

formula ::=
| *judgement*

Jop ::=
| $< m, s > \rightarrow < m', s' >$
| $\Gamma\,(id) = T$ M
| $\Gamma \vdash e : T$
| $\Gamma \vdash m$

judgement ::=
| *Jop*

user_syntax ::=
| *id*
| *v*
| *s*
| *vd*
| *e*
| *m*
| *Tv*
| *T*
| *terminals*

$\boxed{< m, s > \rightarrow < m', s' >}$

$$\frac{}{< v; e, s > \rightarrow < e, s >}\ \text{SEQ1}$$

$$\frac{< e_1, s > \rightarrow < e_1', s' >}{< e_1; e_2, s > \rightarrow < e_1'; e_2, s' >}\ \text{SEQ2}$$

$$\frac{< e, s > \rightarrow < e', s' >}{< id = e, s > \rightarrow < id = e', s' >}\ \text{ASSIGN1}$$

$$\frac{}{< id = v, s > \rightarrow < v, put(s, id, v) >}\ \text{ASSIGN2}$$

$$\frac{}{< id, s > \rightarrow < get(s, id), s >}\ \text{DEREF}$$

$$\frac{}{< \textbf{var}\ id = e, s > \rightarrow < id = e, s >}\ \text{VAR1}$$

$$\frac{}{< \textbf{var}\ id, s > \rightarrow < \textbf{undefined}, s >}\ \text{VAR2}$$

$$\frac{}{< \textbf{var}\ vd, vd', s > \rightarrow < \textbf{var}\ vd; \textbf{var}\ vd', s >}\ \text{VAR3}$$

$\boxed{\Gamma\,(id) = T}$
$\boxed{\Gamma \vdash e : T}$

$$\frac{}{\Gamma \vdash \textbf{n} : \textbf{number}}\ \text{V\_NUM}$$

$$\frac{}{\Gamma \vdash \textbf{b} : \textbf{boolean}}\ \text{V\_BOOL}$$

$$\frac{}{\Gamma \vdash \textbf{str} : \textbf{string}}\ \text{V\_STRING}$$

$$\frac{}{\Gamma \vdash \textbf{undefined} : \textbf{undefined}}\ \textsc{v\_undefined}$$

$$\frac{}{\Gamma \vdash \textbf{null} : \textbf{null}}\ \textsc{v\_null}$$

$$\frac{\Gamma\,(id) = ref < Tv >}{\Gamma \vdash id : T}\ \textsc{DerefType}$$

$$\frac{\Gamma\,(id) = ref < Tv >}{\Gamma \vdash id : ref < Tv >}\ \textsc{RefType}$$

$$\frac{\Gamma \vdash e : T \quad \Gamma \vdash id : ref < Tv >}{\Gamma \vdash id = e : T}\ \textsc{AssignType}$$

$\boxed{\Gamma \vdash m}$

$$\frac{}{\Gamma \vdash \epsilon}\ \textsc{SkipTypable}$$

$$\frac{}{\Gamma \vdash \textbf{var}\ id}\ \textsc{DecTypable}$$

$$\frac{\Gamma \vdash e : T}{\Gamma \vdash e}\ \textsc{ExpTypable}$$

$$\frac{\Gamma \vdash m \quad \Gamma \vdash m'}{\Gamma \vdash m; m'}\ \textsc{SeqTypable}$$

$$\frac{\Gamma \vdash \textbf{var}\ id \quad \Gamma \vdash id = e : T}{\Gamma \vdash \textbf{var}\ id = e}\ \textsc{DefTypable}$$

$$\frac{\Gamma \vdash \textbf{var}\ vd \quad \Gamma \vdash \textbf{var}\ vd'}{\Gamma \vdash \textbf{var}\ vd, vd'}\ \textsc{MultiDecTypable}$$

```
Definition rules:         22 good    0 bad
Definition rule clauses: 35 good    0 bad
```