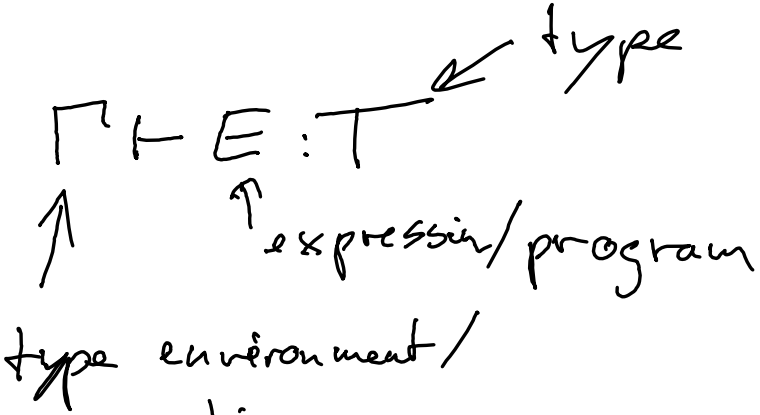
Comp3610/6361

03/08/2023



E is of type T if assumptions in Γ are satisfied.

$$dom(\Gamma) \subseteq dom(s)$$

Γ: type environment

s: state/store

Example

$$\Gamma = \{ \ell \mapsto \text{intref}, m \mapsto \text{intref} \}$$

$$\Gamma : \mathbb{L} \to T_{loc}$$

$$dom(\Gamma) = \{\ell, m\}$$

$$\Gamma(x) = \begin{cases} \text{intref} & \text{if } x = \ell \\ \text{intref} & \text{if } x = m \\ \text{undefined} & \text{otherwise} \end{cases}$$

Example

$s = \{l \mapsto 3, m \mapsto 5, o \mapsto 27\}$

s is partial function of type

$\mathbb{L} \to \text{Int}$

$$s(x) = \begin{cases} 3 & \text{if } x = l \\ 5 & \text{if } x = m \\ 27 & \text{if } x = o \\ \text{undefined} & \text{ow} \end{cases}$$

$dom(s) = \{l, m, o\}$

$\in$

$\{ \ell \mapsto 3, m \mapsto 7 \} \; m := !\ell + 2 : \text{unit}$

↑ given value

$\langle E, \{\ell \mapsto 3, m \mapsto 7\} \rangle \longrightarrow \ldots$ guaranteed by progress

$\langle E, \emptyset \rangle \not\longrightarrow$

Type Checking

$\Gamma(\ell) = \text{int ref}$ ✓ $\quad \{\ell \mapsto \text{int ref}\} \vdash !\ell - 1 : \text{int}$

$\{\ell \mapsto \text{int ref}\} \vdash !\ell > 3 : \text{bool} \qquad \{\ell \mapsto \text{int ref}\} \vdash \ell := !\ell - 1 : \text{unit}$

$\{\ell \mapsto \text{int ref}\} \vdash \text{while } !\ell > 3 \text{ do } \ell := !\ell - 1 : \text{unit}$

Syntax of IMP

$E ::= n \mid b \mid skip \mid$

$E \; op \; E \mid E ; E \mid$

$if \; E \; then \; E \; else \; E \mid$

Base(s) show property for n, b, skip

QED