

Comp 3610/6361

2/8/2023

Ed Stein

- Forum for discussion
- if no email by midnight
send email

$$\langle \mathbb{N}, \overset{\{\}}{\underset{\text{"}}{\emptyset}} \rangle \rightarrow \mathbb{Z}$$

$$\langle 42 + \underbrace{\mathbb{N}}_{E_2}, \emptyset \rangle \rightarrow \mathbb{Z}$$

stud

"the next step"
successor

op \mathbb{Z}

$\langle E, s \rangle \rightarrow \langle \text{skip}; \text{while } \dots, s \rangle$

$\rightarrow \langle \text{while } \dots, s \rangle$

$\rightarrow \langle \text{if } !l_1 \geq 1 \text{ then } l_2 := !l_2 + !l_1; l_1 := !l_1 + j; \text{while } \dots$
 $\text{else skip}, s \rangle$

$\rightarrow \langle \text{if } 3 \geq 1 \text{ then } \dots, s \rangle$

$\rightarrow \langle \text{if true then } \dots, s \rangle$

$\rightarrow \langle l_2 := !l_2 + !l_1; l_1 := !l_1 - 1; \text{while } \dots, s \rangle$

$\langle (l := 1; 0) + (l_2 := 2; 0), \{l \mapsto 0\} \rangle$
 $\rightarrow \langle (\text{skip}; 0) + (l_2 := 2; 0), \{l \mapsto 1\} \rangle$
 $\rightarrow \langle 0 + (l_2 := 2; 0), \{l \mapsto 1\} \rangle$
 $\rightarrow \langle 0 + \text{skip}; 0, \{l \mapsto 2\} \rangle$
 $\rightarrow \langle 0 + 0, \{l \mapsto 2\} \rangle$
 $\rightarrow \langle 0, \{l \mapsto 2\} \rangle$

$$(map + (op1')) + (op2')$$

$$\langle (2+3) + (4+5), \emptyset \rangle$$

non-deterministic

$$\langle 5 + (4+5), \emptyset \rangle$$

$$\langle (2+3) + 9, \emptyset \rangle$$

$$\langle 5 + 9, \emptyset \rangle$$

$$\langle 14, \emptyset \rangle$$

$\langle !l_1, \{l_1 \mapsto 3, l_2 \mapsto 0\} \rangle \rightarrow \langle 3, \{l_1 \mapsto 3, l_2 \mapsto 0\} \rangle$ ^{deeref}

$\langle !l_1 \geq 1, \{l_1 \mapsto 3, l_2 \mapsto 0\} \rangle \rightarrow \langle 3 \geq 1, \{l_1 \mapsto 3, l_2 \mapsto 0\} \rangle$ ^{op1}

$\langle \text{if } !l_1 \geq 1 \text{ then } \underline{\tau_2} \text{ else skip}, \{l_1 \mapsto 3, l_2 \mapsto 0\} \rangle$
 $\rightarrow \langle \text{if } 3 \geq 1 \text{ then } \dots, \dots \rangle$ ^{wp3}

$\emptyset \vdash 3 : \text{int}$

$\sim \vdash 3 + 4 : \text{int}$

$3 + \text{true}$ no type / not well-typed

$\text{!} : \text{int} \rightarrow \text{bool}$
 $\vdash !2 + 3 : \text{int}$

