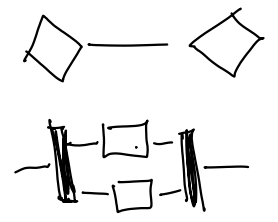


# Actors

Concurrency

AFBV



$$e ::= \dots \mid \text{Create}(e, e) \mid e \leftarrow e$$

$$v ::= \dots \mid a$$

$a ::= \langle \text{int. set of actor names} \rangle$

$$G ::= \{ a \leftarrow v, \dots, a \mapsto v, \dots \}$$

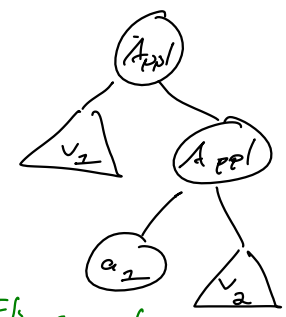
$$e \xrightarrow{G} v$$

$$e \Rightarrow \langle v, G \rangle$$

$$\frac{e_1 \xrightarrow{G_1} v_1 \quad e_2 \xrightarrow{G_2} v_2 \quad a_1 \text{ fresh} \quad v_1 \ a_1 \ v_2 \xrightarrow{G_3} v_3}{\text{Create}(e_1, e_2) \xrightarrow{G_1 \cup G_2 \cup G_3 \cup \{a_1 \mapsto v_3\}} a_1}$$

$$\text{Value Rule} \quad \frac{}{v \Rightarrow v}$$

$$\frac{e_1 \xrightarrow{G_1} a_1 \quad e_2 \xrightarrow{G_2} v_2}{e_1 \leftarrow e_2 \xrightarrow{G_1 \cup G_2 \cup \{a_1 \mapsto v_2\}} v_2}$$



hypothetical fb ss rel  
 $e \rightarrow e$

- pre-actor
- Function my\_addr →
- Function local\_data →
- Function msg → } actor

$G$  is a bag

small step global state relation

$$G_1 \rightarrow G_2$$

$$\frac{(a \leftarrow v_1) \in G_1 \quad (a \mapsto v_2) \in G_1 \quad v_2 \ v_1 \xrightarrow{G_3} v_3 \quad (G_1 \setminus (a \leftarrow v_1) \setminus (a \mapsto v_2)) \cup \{a \mapsto v_3\} \cup G_3 = G_2}{G_1 \rightarrow G_2}$$

$$G_1 \xrightarrow{*} G_n \stackrel{\text{def}}{=} G_1 \rightarrow G_2 \rightarrow \dots \rightarrow G_n$$

$$G_1 \xrightarrow{!} G_n \stackrel{\text{def}}{=} G_1 \xrightarrow{*} G_n \quad \text{and} \quad \nexists G_{n+1}. G_n \rightarrow G_{n+1}$$

- $e \xrightarrow{G_0} v$
- $G_0 \xrightarrow{!} G_n$
- result  $v$