

1 Operators

$$\frac{(a, \sigma_0) \rightarrow (v_a, \sigma_1) \quad (b, \sigma_1) \rightarrow (v_b, \sigma_2) \quad t = f(\sigma_2, v_a, v_b)}{(a * b, \sigma_0) \rightarrow (t, \sigma_2)}$$

where $*$ is an operator and f is the function which corresponds to that operator.

2 Closures

$$(\lambda x. e, \sigma) \rightarrow ((x, e, \Gamma), \sigma)$$

3 Function Application

$$\frac{\Gamma \vdash (f, \sigma_0) \rightarrow ((x, e, \Gamma'), \sigma_1) \quad \Gamma \vdash (a, \sigma_1) \rightarrow (v_a, \sigma_2) \quad \Gamma', x \mapsto \alpha \vdash (e, \sigma_2[\alpha \mapsto v_a]) \rightarrow (v_r, \sigma_3)}{\Gamma \vdash (f(a), \sigma_0) \rightarrow (v_r, \sigma_3)}$$

where α is a fresh address

4 Sequencing

$$\frac{\Gamma_0 \vdash (s_0, \sigma_0) \xrightarrow{s} (\Gamma_1, \sigma_1) \quad \Gamma_1 \vdash (s_1, \sigma_1) \xrightarrow{s} (\Gamma_2, \sigma_2)}{\Gamma_0 \vdash (\{s_0; s_1\}, \sigma_0) \xrightarrow{s} (\Gamma_2, \sigma_2)}$$

5 While Loops

$$\frac{\Gamma_0 \vdash (e, \sigma_0) \rightarrow (T, \sigma_1) \quad \Gamma_0 \vdash (s, \sigma_1) \xrightarrow{s} (\Gamma_1, \sigma_2) \quad \Gamma_0 \vdash (\text{while } e: s, \sigma_2) \xrightarrow{s} (\Gamma_2, \sigma_3)}{\Gamma_0 \vdash (\text{while } e: s, \sigma_0) \xrightarrow{s} (\Gamma_0, \sigma_3)}$$

$$\frac{\Gamma_0 \vdash (e, \sigma_0) \rightarrow (F, \sigma_1)}{\Gamma_0 \vdash (\text{while } e: s, \sigma_0) \xrightarrow{s} (\Gamma_0, \sigma_1)}$$