

Andromedan effects & handlers

Syntax

Expression

$e ::=$

x

Type

$\text{fun } x \Rightarrow c$

Computation

$c ::=$

$\text{val } e$

$\#op \ e$

$\text{let } x = c_1 \text{ in } c_2$

$\text{handle } c \text{ with } h$

$e_1 @ e_2$

$[x : e] c \mid e_1[e_2]$

$\pi e \mid \lambda e$

$\text{refl } e$

$e_1 \equiv e_2$

$\text{match } e \text{ with } (p_i \rightarrow c_i);$

$e_1 e_2$

Pattern $p ::= c \mid [x : c] p$

Handler $h ::= \text{val } x \rightarrow c_v \mid (\#op_i \ x \ k \rightarrow c_i);$

Result $r ::= \text{val } V \mid \#op(v, x.c)$

Term $v ::=$

Type

$N_1 @^{x:v_2, N_3} v_4$

$\lambda x : N_1. N_2. N_3$

$(x : v_1) \rightarrow N_2$

$\text{refl}_{N_1} v_2$

$N_1 \equiv_{v_2} N_3$

$[x : N_1] v_2$

Value $V ::= ([x_1, \dots, x_n], N_1, N_2)$

$\mid \text{fun } x \rightarrow c + ? \text{ closure}$

← maybe two kinds of variables (symbols in τ , identifiers in η)

Operational semantics:

Context $\Gamma ::= x_1:N_1, \dots, x_n:N_n$
Environment $\eta ::= (y_1:N_1, \dots, y_n:N_n)$

Big-step:

$\Gamma; \eta \mid c \Downarrow r$

$\Gamma; \eta \mid e \Downarrow V$