

17) partial-eval prog \rightarrow prog ^{dyn / static}
 eval : prog \rightarrow ans (values)

pe (+ (+ 1 2 3 4) (+ 5 6 7 8)) = (+ 36 (read))
 (read) \nearrow dynamic
 static

(define (add/x) #t true
 (if (~~num~~ x) (+ x 1)
 (error)))
 (add 5) (add 6)
 (add (read)) (1/4) (add y))

(L(x) M) N
 $B \rightarrow M[x \in N]$
 super \rightarrow B
 optimizer

gather information \rightarrow finding the predicates
 move it to an exploit point \rightarrow when constraints satisfied
 exploit it \rightarrow transformation improves a node

abstract

environment analysis

17-2

↳ 1. $[x \mapsto 3, y \mapsto 4]$

2. $[x \mapsto 7]$

3. $[x \mapsto 3, y \mapsto 8]$

~~~~~>

1.  $[x \mapsto \text{num}, y \mapsto \text{num}]$

2.  $[x \mapsto \text{num}]$

3.  $[x \mapsto \text{num}, y \mapsto \text{num}]$



given  $p_1$  and  $p_2$

$\{v \mid p_1(x) = p_2(v)\}$

$1, 2 = \emptyset$

$1, 3 = \{x\}$

$1, 2 = \{x\}$

$1, 3 = \{x, y\}$

(1 (x y z)  
body)

1. control — code that gets run

2. data — funcs and vals

3. env —  $[x \mapsto ?, y \mapsto ?, z \mapsto ?]$

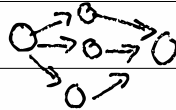
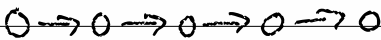
1  $M, N = X$

1  $X, M$

1  $M, N$

(1 X, M) N

$\mapsto M[X \leftarrow N]$



17-3/  $(+ (+ 1 1)) \rightarrow (+ 2 2)$   $\rightarrow (+ 2 4)$   
 $(+ 2 2) \rightarrow (+ (+ 1 1) 4)$   $\rightarrow (+ 2 4)$   $\downarrow$   
 6

$(\lambda (y) (\lambda (x) (+ x y)))$  let  $x = 1 + 1$   
 $(+ 1 1)))$   $(+ 2 2))$   $y = 2 + 2$  ANF  
 in  $x + y$  A-Normal Form

(define (fac n)  
 (if (zero? n)  
 1  
 (\* n (fac (sub1 n))))))

Assume fns never return.

(define (fac n ret)  
 (zero? n) (\ (zn)  
 (ifun zn (\ () (ret 1))  
 (\ ()  
 (sub1 n) (\ (sr)  
 (fac sr) (\ (fr)  
 (\* n fr ~~(+ (mr) (ret mr))~~  
 ret))))))

CPS  
 L continuation  
 passing  
 style

call/cc =  $(\lambda (f cc) (f (\lambda (x k) (cc x)) cc))$

$$\underline{174)} \quad pr \in PRG = LAM$$

$$v \in VAR = \text{identification}$$

$$REF = v^l$$

$$lam \in LAM = (\lambda (v_1 \dots v_n) call)^l$$

$$call \in CALL = (f e_1 \dots e_n)^l$$

$$f, e \in EXP = REF + LAM$$

$$l \in LAB = \text{set of labels}$$

$$pr = (\lambda (halt) call)$$

$$st \in STATE = Eval + Apply$$

$$Eval = CALL \times BEnv \times Conf \times Time$$

$$Apply = Proc \times D^* \times Conf \times Time$$

$$t \in TIME = \text{an infinite order set}$$

$$proc \in PROC = Clo + \{halt\}$$

$$clo \in CLO = LAM \times BEnv$$

$$val \in VAL = PROC$$

$$d \in D = Val$$

17-5/

$B \in BEnv = VAR \rightarrow Time$   
 $b \in Bind = Var \times Time$   
 $ve \in VEnv = Bind \rightarrow D$   
 $c \in Conf = VEnv$