

CPS :: Expr → Expr

$$\text{cps } \llbracket n \rrbracket = (\text{lam } (k) \quad (k \ n))$$

$$\text{cps } \llbracket n \rrbracket = \text{lam}(k): k(n) \text{ end}$$

$$\begin{aligned} \text{cps } \llbracket (+ \ e_1 \ e_2) \rrbracket &= (\text{lam } (k) \\ &\quad (\text{cps } \llbracket e_1 \rrbracket \\ &\quad\quad (\text{lam } (v_1) \\ &\quad\quad\quad (\text{cps } \llbracket e_2 \rrbracket \\ &\quad\quad\quad\quad (\text{lam } (v_2) \\ &\quad\quad\quad\quad\quad (k \ (+ \ v_1 \ v_2)))))) \end{aligned}$$

$$\begin{aligned} \text{cps } \llbracket e_1 \ + \ e_2 \rrbracket &= \text{lam}(k): \\ &\quad \text{cps } \llbracket e_1 \rrbracket (\text{lam}(v_1): \\ &\quad\quad \text{cps } \llbracket e_2 \rrbracket (\text{lam}(v_2): \\ &\quad\quad\quad k(v_1 + v_2) \\ &\quad\quad\quad \text{end}) \\ &\quad\quad \text{end}) \\ &\quad \text{end}) \end{aligned}$$

$$\text{cps} \llbracket (\text{if } e_c \ e_t \ e_x) \rrbracket = (\text{lam } (k) \\
\cdot (\text{cps} \llbracket e_c \rrbracket \\
(\text{lam } (v_c) \\
(\text{if } v_c \\
(\text{cps} \llbracket e_t \rrbracket k) \\
(\text{cps} \llbracket e_x \rrbracket k) \rangle \rangle)))$$

$$\text{cps} \llbracket \text{if } e_c: e_t \ \text{else}: e_x \ \text{end} \rrbracket = \\
\text{lam } (k): \\
\text{cps} \llbracket e_c \rrbracket (\text{lam } (v_c): \\
\text{if } v_c: \\
\text{cps} \llbracket e_t \rrbracket (k) \\
\text{else}: \\
\text{cps} \llbracket e_x \rrbracket (k) \\
\text{end} \\
\text{end} \\
\text{end}$$

$$\text{cps} \llbracket (\text{lam } (x) \ e) \rrbracket = (\text{lam } (k) \\ (k \ (\text{lam } (x \ k_f) \\ (\text{cps} \llbracket e \rrbracket \ k_f))))$$

$$\text{cps} \llbracket \text{lam } (x): \ e \ \text{end} \rrbracket = \text{lam } (k): \\ k(\text{lam } (x, k_f): \\ \text{cps} \llbracket e \rrbracket (k_f) \\ \text{end}) \\ \text{end}$$

$$\text{cps} \llbracket (e_f \ e_a) \rrbracket = (\text{lam } (k) \text{ (cps} \llbracket e_f \rrbracket \text{ (lam } (v_f) \text{ (cps} \llbracket e_a \rrbracket \text{ (lam } (v_a) \text{ (v_f } \ v_a \ k)))))))$$

$$\text{cps} \llbracket e_f(e_a) \rrbracket = \text{lam } (k):$$

$$\text{cps} \llbracket e_f \rrbracket (\text{lam } (v_f):$$

$$\text{cps} \llbracket e_a \rrbracket (\text{lam } (v_a):$$

$$v_f(v_a, k)$$

$$\text{end})$$

$$\text{end})$$

$$\text{end}$$

Each k is a continuation of the program

Each k is a $List < Context >$
(a stack)



In Pyret:

```
fun f(x):  
  f(x)  
end
```



```
fun f(x, k):  
  if STACK_COUNTER == 0:  
    save(f, x, k)  
    raise("Pause")  
  dsc:  
    f(x, k)  
end
```

Put stack in
a data
structure,
Pause + resume

