

Ways to define behavior:

Write rules
↑

Encoding

This week

Records

FbR

$e ::= \underbrace{\dots}_{Fb} \mid \{l=e, \dots\} \mid e.l$
? zero or more? one or more?

$v ::= \underbrace{\dots}_{Fb} \mid \{l=v, \dots\}$

$l ::= (\text{identifiers})$

In all record expressions $\{l_1=e_1, \dots, l_n=e_n\}$,
 all labels l_k must be unique.

Record expression elements are unordered:

Record

$$\frac{e_1 \Rightarrow v_1 \quad \dots \quad e_n \Rightarrow v_n}{\{l_1=e_1, \dots, l_n=e_n\} \Rightarrow \{l_1=v_1, \dots, l_n=v_n\}}$$

Projection

$$\frac{e \Rightarrow \{l_1=v_1, \dots, l_n=v_n\} \quad l=l_i}{e.l \Rightarrow v_i}$$

$$\{a=4, b=True\} \Rightarrow \{a=4, b=True\}$$

$$\{a=1+2, b=False\}.a \Rightarrow 3$$

$$(\{a=Function\ x \rightarrow x\}.a) 4 \Rightarrow 4$$

$$5.a \neq$$

~~$$\{a=4, a=3\}.a \Rightarrow 4$$~~

~~$$\{a=4, a=3\}.a \Rightarrow 3$$~~

$$\forall i \in \{1, \dots, n\}. e_i \Rightarrow v_i$$

Variants

$\boxed{F \vdash V}$

$e ::= \overset{\text{Fb exprs}}{\dots} \mid \text{'l } e \mid \text{Match } e \text{ With } \text{'l } x \rightarrow e'' \dots$
 $v ::= \dots \mid \text{'l } v$
Fb vals

$\text{'Foo } 5 \Rightarrow \text{'Foo } 5$
 $\text{'Bar (True And False)} \Rightarrow \text{'Bar False}$

Variant $\frac{e \Rightarrow v}{\text{'l } e \Rightarrow \text{'l } v}$

Match 'Bar 3 With
 $\text{'l 'Foo } a \rightarrow a+1$
 $\text{'l 'Bar } b \rightarrow b-1$
 $\Rightarrow 2$

Match $\frac{\overset{\text{green}}{e_0 \Rightarrow \text{'l}_i v} \quad \text{'l} = \text{'l}_i \quad e_i [v/x_i] \Rightarrow v'}{\text{Match } e_0 \text{ With } \text{'l}_1 x_1 \rightarrow e_1 \dots \text{'l}_n x_n \rightarrow e_n \Rightarrow v'}$

Records & Variants: Dual Encoding

Can encode FbV in FbR because functions!
Can encode FbR in FbV

Given a program in FbV, assign all labels l a number. (e.g. Foo=1, Bar=13, etc.)

$l \ e \ \underline{\underline{\text{def}}} \ \{ \text{type} = \#, \text{value} = e \}$

Match e_0 With

$l_1 \ x_1 \rightarrow e_1$

\dots
 $l_n \ x_n \rightarrow e_n$

def

Let $r = e_0$ In

If $r.\text{type} = \#_1$ Then

Let $x_1 = r.\text{value}$ In e_1

Else If \dots

\dots
Else If $r.\text{type} = \#_n$ Then

Let $x_n = r.\text{value}$ In e_n

Else

$\circ \circ$

Given a program written in FbR, assign all labels l a number.

$\{ l_1 = e_1, \dots, l_n = e_n \} \ \underline{\underline{\text{def}}}$

(Let $a_1 = e_1$ In

Let $a_n = e_n$ In

Function $|b| \rightarrow$

If $\#_1$ Then a_1 Else

\vdots

If $\#_n$ Then a_n Else

$\circ \circ$

)

$e.l \ \underline{\underline{\text{def}}} \ e \ \#$