

• Q&A

map o fold :: ?

map :: $(a \rightarrow b) \rightarrow [a] \rightarrow [b]$

fold :: $(c \rightarrow d \rightarrow d) \rightarrow d \rightarrow [c] \rightarrow d$

(o) :: $f \rightarrow g$ \rightarrow $e \rightarrow f$ $\rightarrow e \rightarrow g$

(o) map fold

∴ $f \rightarrow g \sim (a \rightarrow b) \rightarrow ([a] \rightarrow [b])$

$e \rightarrow f \sim (c \rightarrow d \rightarrow d) \rightarrow (d \rightarrow [c] \rightarrow d)$

$f \sim a \rightarrow b \sim d \rightarrow ([c] \rightarrow d)$
 $g \sim [a] \rightarrow [b]$
 $e \sim c \rightarrow d \rightarrow d$

$$a \sim d$$

$$b \sim [c] \rightarrow d$$

$$\text{map} \circ \text{Foldr} \therefore e \rightarrow g$$

$$\therefore (c \rightarrow d \rightarrow d) \rightarrow [a] \rightarrow [b]$$

$$\therefore \sim \rightarrow [d] \rightarrow [b]$$

$$\therefore (c \rightarrow d \rightarrow d) \rightarrow [d] \rightarrow [c] \rightarrow d$$

$$\text{sum } [] = 0$$

$$\text{sum } (x:xs) = x + \text{sum } xs$$

$$\text{or } [] = \text{False}$$

$$\text{or } (x:xs) = x \parallel \text{or } xs$$

$$\text{filter } p \ [] = []$$

$$\text{filter } p \ (x:xs) = \text{let } r = \text{filter } p \ xs \text{ in} \\ \text{if } p\ x \text{ then } x:r \text{ else } r$$

$$\text{sum } xs = \text{foldr } f \ z \ xs$$

WHERE

$$z = 0$$

$$f \ x \ r = x + r$$

$$= \text{foldr } (+) \ 0 \ xs$$

$$\text{or } xs = \text{foldr } f \ z \ xs$$

WHERE

$$z = \text{False}$$

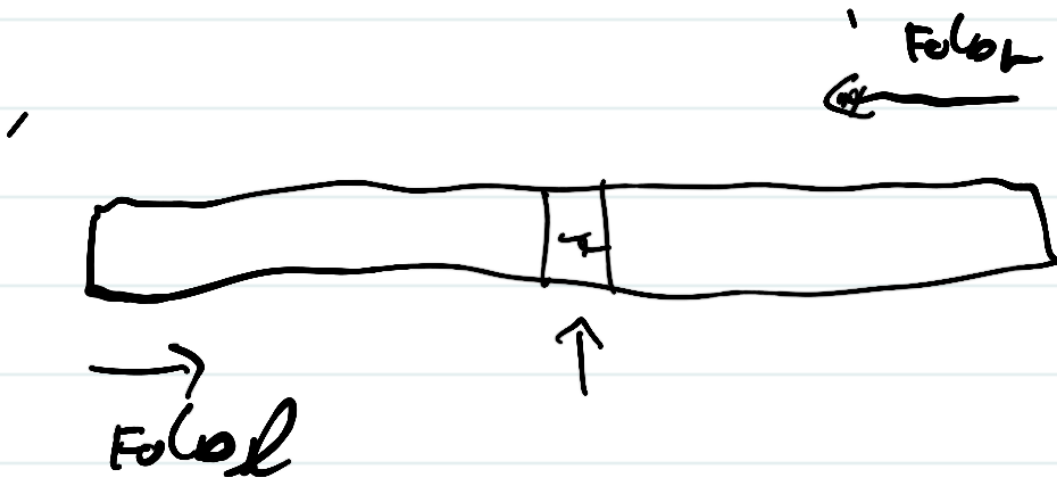
$$f \ x \ r = x \parallel r$$

Filter $p = \text{Foldr } f \ z$

WHERE

$z = []$

$f \ x \ r = \text{if } p\ x, \text{ then } x:r \text{ else } r$



or $xs = \text{Foldr } g \ v \ xs$

WHERE

$v = \text{False}$

$g \ x \ r = x || r$

$$\text{sum } xs = \text{foldr } f \ 0 \ x$$

where

$$f = \dots$$

$$= \text{foldr } (\lambda x r \rightarrow x + r) \ 0 \ xs$$

$$\text{DATA Maybe } a = \begin{array}{l} \text{Nothing} \\ \text{Just } a \end{array}$$

$$\text{SAFE HEAD} \quad :: [a] \Rightarrow \text{Maybe } a$$

$$\text{SAFE HEAD} \quad (x : _) = \text{Just } x$$

$$\text{SAFE HEAD} \quad [] = \text{Nothing}$$

$$\text{FOO} \quad :: \text{Maybe } a \rightarrow \sim$$

$\text{Foo Nothing} = \dots$
 $\text{Foo (Just x)} = \dots$

DATA TREE $a \ b = \text{Leaf} \ a$
 | Node
 $\left\{ \begin{array}{l} \text{Tree } a \ b \\ b \\ \text{Tree } a \ b \end{array} \right.$

HEIGHT \therefore Tree $a b \rightarrow 1m$

$$\text{HEIGHT}(\text{leaf } x) = 1$$
$$\text{HEIGHT}(\text{Node } l \text{ \& } r) = 1 + \max(\text{HEIGHT } l, \text{HEIGHT } r)$$

$\text{ANNOTATE} :: \text{Tree } b \text{ Int} \rightarrow \text{Tree } (\underline{\text{Int}}, \underline{\text{Int}})$
 $\underline{\text{Int}}$

$\text{ANNOTATE } (\text{LEAF } x) = \text{LEAF } x$

$\text{ANNOTATE } (\text{NODE } l \ y \ r) = \text{NODE } l' \ z \ r'$

WHERE

$l' = \text{ANNOTATE } l$

$r' = \text{ANNOTATE } r$

$z = (\text{GET MIN } l' \quad \text{'MIN'} \quad \text{GET MIN } r')$
 $\quad \quad \quad \text{GET MAX } l' \quad \text{'MAX'} \quad \text{GET MAX } r'$

$\text{GET MIN} :: \text{Tree } (\text{Int}, \text{Int}) \text{ Int} \rightarrow \text{Int}$

$\text{GET MIN } (\text{LEAF } x) = x$

$\text{GET MIN } (\text{NODE } - \ (m, -) \ -) = m$