

Syntactic Transformation To Monadic Form

- ***Expressions:***

----- exp -----

*desugar*_{<exp>} :: *Exp* → *Exp*

*desugar*_{<exp>} exp = *desugar*_{<lexp>} exp >>= \h → return h

----- lexp -----

*desugar*_{<lexp>} :: *Exp* → *Exp*

-----lexp: fexp -----

*desugar*_{<lexp>} fexp = *firstDesugar*_{<fexp>} fexp

*firstDesugar*_{<fexp>} literal = return literal

*firstDesugar*_{<fexp>} qvar = qvar

*firstDesugar*_{<fexp>} gcon = gcon

*firstDesugar*_{<fexp>} (exp) = *desugar*_{<lexp'>} exp

*firstDesugar*_{<fexp>} (fexp literal) = *desugar*_{<lexp'>} fexp literal

*firstDesugar*_{<fexp>} (fexp qvar) = *desugar*_{<lexp'>} fexp qvar

*firstDesugar*_{<fexp>} (fexp gcon) = *desugar*_{<lexp'>} fexp gcon

*firstDesugar*_{<fexp>} (fexp literal) = *desugar*_{<lexp'>} fexp literal

*firstDesugar*_{<fexp>} (fexp (exp)) = exp >>= \ex_i → *desugar*_{<lexp'>} fexp ex_i

*desugar*_{<lexp'>} fexp = *desugar*_{<fexp>} fexp

----- fexp -----

*desugar*_{<fexp>} aexp = *desugar*_{<aexp>} aexp

*desugar*_{<fexp>} (fexp literal) = *desugar*_{<lexp'>} fexp literal >>= \h → h

*desugar*_{<fexp>} (fexp qvar) = *desugar*_{<lexp'>} fexp qvar >>= \h → h

*desugar*_{<fexp>} (fexp gcon) = *desugar*_{<lexp'>} fexp gcon >>= \h → h

*desugar*_{<fexp>} (fexp (exp)) = exp >>= \ex_i → *desugar*_{<lexp'>} fexp ex_i >>= \h → h

----- aexp -----

$\text{desugar}_{\langle \text{aexp} \rangle} \text{ literal} = \text{literal}$

$\text{desugar}_{\langle \text{aexp} \rangle} \text{ qvar} = \text{qvar}$

$\text{desugar}_{\langle \text{aexp} \rangle} \text{ gcon} = \text{gcon}$

$\text{desugar}_{\langle \text{aexp} \rangle} (\text{exp}) = (\text{desugar}_{\langle \text{lexp}' \rangle} \text{ exp})$

-----lexp: let decls in exp -----

$\text{desugar}_{\langle \text{lexp} \rangle} (\text{let decls in exp}) = \text{desugar}_{\langle \text{declrs} \rangle} \text{ decls exp}$

- ***Declarations***

----- declrs -----

$\text{desugar}_{\langle \text{declrs} \rangle} :: \text{Declrs} \rightarrow \text{Exp}$

$\text{desugar}_{\langle \text{declrs} \rangle} (\text{declr1}; \dots ; \text{declrn}) = \text{desugar}_{\langle \text{declr} \rangle} \text{ declr1} \dots \text{desugar}_{\langle \text{declr} \rangle} \text{ declrn}$
 $\quad \quad \quad | \quad (;) = _ \rightarrow$

----- declr -----

$\text{desugar}_{\langle \text{declr} \rangle} (\text{funlhs} \mid \text{pat}) (= \text{exp}) = \text{exp} \gg= \backslash(\text{funlhs} \mid \text{pat}) \rightarrow$