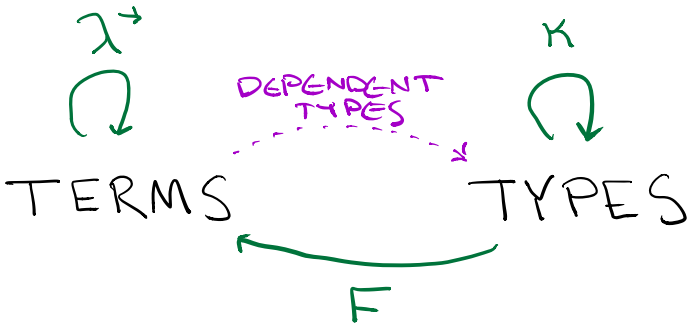


Coq
NuPRL
LEAN

F*
Idris

List : type ⇒ type
List int : type

LIST LIBRARY IN $\lambda^{\rightarrow}$

IList : type (KINDING)

nil : IList
cons : int → IList → IList
hd : IList → int
tl : IList → IList
isnil : IList → bool

type nat = Zero
| Succ of nat

DEPENDENTLY TYPED LIST LIBRARY

$\tau ::= \dots \mid \Pi x:\tau_1.\tau_2$

$\text{IList} : \text{nat} \Rightarrow \text{type}$

$\text{nil} : \text{IList } 0$

$\text{cons} : \Pi n:\text{nat}.\ \text{int} \to \text{IList } n \to \text{IList } (\text{succ } n)$

$\underbrace{\Pi n:\text{nat}.\ \text{int} \to \text{IList } n \to \text{IList } (\text{succ } n)}_{\text{nat} \Rightarrow \text{type}}$

$\text{hd} : \Pi n:\text{nat}.\ \text{IList}(\text{succ } n) \to \text{int}$

$\text{tl} : \Pi n:\text{nat}.\ \text{IList}(\text{succ } n) \to \text{IList } n$

$\lambda n:\text{nat}.\ \lambda l:\text{IList } (\text{succ } (\text{succ } n)).$

$(\text{hd } (\text{succ } n)\ l)$

$+$

$(\text{hd } n\ \underbrace{(\text{tl } (\text{succ } n)\ l)}_{: \text{IList } (\text{succ } n)})$

sort:

$\Pi\, n : nat.\ IList\ n \to IList\ n$

ω $\{m < n\}$

get : $\Pi\, m : nat.$
$\Pi\, n : nat.$
$(Less\ m\ n) \to$
$IList\ n \to int$

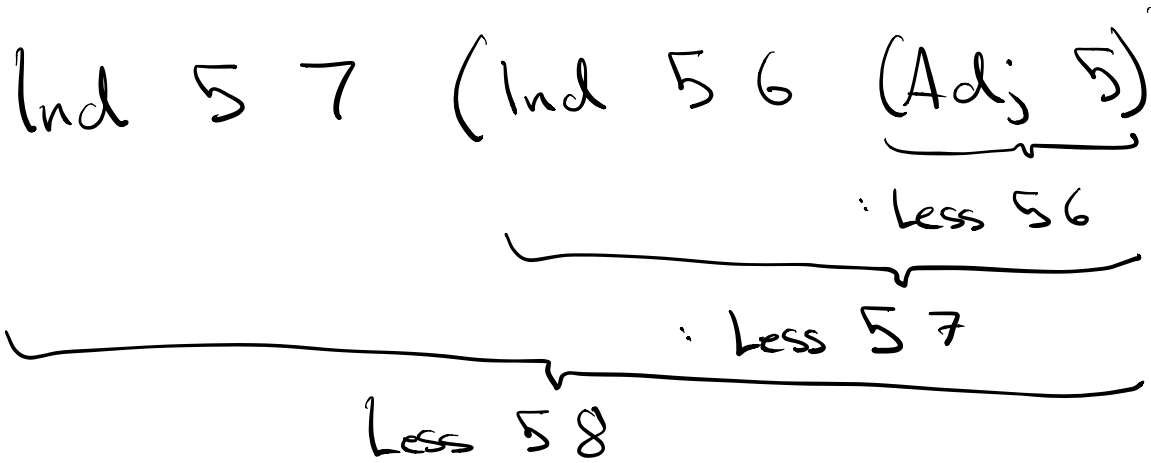
$\{\}$

type
foo =
Bar of int

Bar 5 : foo
Bar 7 : foo

Adjacent : $\Pi\, m : nat.$
$Less\ m\ (succ\ m)$

Inductive : $\Pi\, m : nat.$
$\Pi\, n : nat.$
$(Less\ m\ n) \to$
$(Less\ m\ (succ\ n))$


Ind 5 7 (Ind 5 6 (Adj 5))
: Less 56
: Less 57
Less 58