Logic Programs as Specifications

fleck@tornado [101]% more list.laws
% Laws of lists ARE programs -- CLP(R) version

length([],0).
length([X|Xs],N+1) :- length(Xs, N).
% Xs,N,X . length(Xs, N) => length([X | Xs], N+1)

member(X,[X|Xs]).               % X,Xs member(X, [X | Xs])
member(X,[Y|Xs]) :- member(X,Xs).
% X,Y,Xs . member(X, Xs) => member(X, [Y | Xs])

select([X|Xs],1, X).               % X,Xs select([X | Xs] ,1, X)
select([X|Xs], N+1, Y) :- select(Xs, N, Y).
% X,Y,N,Xs . select(Xs, N, Y) => select([X | Xs], N+1, Y)

insert( Y, Xs, 1, [Y|Xs]). % Y,Xs insert(Y, Xs, 1, [Y | Xs])
insert(Y, [X|Xs], N+1, [X|Ys]) :- N>0, insert(Y, Xs, N, Ys).
% X,Y,N,Xs,Ys . N>0 ∧ insert(Y, Xs, N, Ys) =>
\[ % \quad insert(Y, [X|Xs], N+1, [X | Ys])\]
append([], Ys, Ys). % Ys append([], Ys, Ys)
append([X|Xs], Ys, [X|Zs]) :- append(Xs, Ys, Zs).
% X, Xs, Ys, Zs. append(Xs, Ys, Zs) =>
% append([X|Xs], Ys, [X|Zs])

fleck@tornado [102]% clpr

CLP(R) Version 1.2
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1 ?- consult('list.laws').
Warning: Style check, singleton variables, rule 2 of length/2
    +++  X
    *** Yes

2 ?- member(b,[a,b,c]).

*** Retry?

3 ?- member(d,[a,b,c]).
*** No
4 ?- member(X,[a,b,c]).
    X = a
    *** Retry? ;
    X = b
    *** Retry? ;
    X = c
    *** Retry? ;

    *** No

5 ?- member(b,[a,X,c]).
    X = b
    *** Retry?

6 ?- member(X,[a,b,c,d]), member(X,[c,d,e]).
    X = c
    *** Retry? ;
    X = d
    *** Retry? ;

    *** No

7 ?- append([a,b], [c,d], As).
    As = [a, b, c, d]

    *** Yes

8 ?- append(As, [c,d], [a,b,c,d]).
    As = [a, b]

    *** Retry?
9 ?- append(As, Bs, [a,b,c]).  
   Bs = [a, b, c]  
   As = [ ]  

   *** Retry? ;  
   Bs = [b, c]  
   As = [a]  

   *** Retry? ;  
   Bs = [c]  
   As = [a, b]  

   *** Retry? ;  
   Bs = [ ]  
   As = [a, b, c]  

   *** Retry? ;  

   *** No

10 ?- insert(c,[a, b, d], 3, As).  
   As = [a, b, c, d]  

   *** Retry?

11 ?- insert(c,[a,b,d],N,[a,b,c,d]).  
   N = 3  

   *** Retry?
12 ?- select([a,b,c,d],3,X).
X = c

*** Retry? ;

*** No

13 ?- select([a,b,c,d],N,b).
N = 2

*** Retry? ;

*** No

14 ?- select([a,b,X,d],N,c).
X = c
N = 3

*** Retry?
fleck@tornado [103]% exit
exit
script done