... Other Useful Prolog Built-Ins ...

If-then-else

If P then Q, else R can be writte as follows:

```
S :- P -> Q ; R.
```

Here's an example:

```
max(X,Y,Z) :-
  ( X =< Y
     -> Z=Y
     ; Z=X
  ).
```

Interestingly, one common use of the cut predicate is to mimic the "if-then-else" construct found in imperative languages. Here's how we can define it:

```
S :- P, !, Q.
S :- R.
```

If-then-else (cont)

Another example:

Write a predicate to add an element to a list with the restriction that no duplicates are added to the list. Define the predicate `add(X,L1,L2)` to mean "the result of adding X to L1 is L2."

Here's how to do it with cut:

```
add(X,L1,L2) :- member(X,L1), !, L2 = L1.
add(X,L1,L2) :- L2 = [X|L1].
```

Here's how to do it using if-then-else:

```
add(X,L1,L2) :- member(X,L1) -> L2 = L1
                ; L2 = [X|L1].
```

univ

The standard built-in predicate called 'univ' (=..) translates a predicate and its arguments into a list whose first element is the predicate name and whose remaining elements are the arguments. It works in reverse as well.

For example,

```
?- pred(arg1,arg2) =..  X.
X = [pred, arg1, arg2]

?- pred =..  X.
X = [pred]

?- X =..  [pred,arg1,arg1].
X = pred(arg1, arg2)

?- X =..  [pred].
X = pred
```

Example using univ

Define polygons figures as follows:

```
square(Side)
triangle(Side1,Side2,Side3)
circle(R)
..
```

We'd like to define a predicate that enlarges each of these figures.

```
enlarge(Fig,Factor,Fig1).
```

Here's one way:

```
enlarge(square(A),F,square(A1) :-
  A1 is F*A.
enlarge(circle(R),F,circle(R1) :-
  R1 is F*R1.
...
```

Using **univ**, we can do it much more elegantly:

```
enlarge(Fig,F,Fig1) :-
  Fig=..[Type|Parameters],
  multiplylist(Parameters,F,Parameters1),
  Fig1=..[Type|Parameters1].

multiplylist([],_,[]).

multiplylist([X|L],F,[X1|L1]) :-
  X1 is F*X, multiplylist(L,F,L1).
```

cal, functor, arg

call allows you to call a predicate. E.g.,

```
Goal=..[Functor | Arglist].
call(Goal).
```

Alternatively, you can do this with **functor** and **arg**.

```
functor(Term,F,N)
```

functor is true if F is the principal functor of Tern and N is the arity of F.

```
arg(N,Term,A)
```

arg is true if A is the Nth argument in Term, assuming that arguemnts are numbered from left to right starting with 1.

E.g.

```
?- functor(t(f(X),X,t),Fun,Arity).
   Fun=t
   Arity=3

?- arg(2,f(X,t(a),t(b)),Y).
   Y=t(a)

?- functor(D,examdate,3),
   arg(1,D,22),
   arg(2,D,april),
   arg(3,D,2004).

   D=examdate(22,april,2004)
```

assert/retract

Here is an example illustrating how clauses may be added and deleted from the Prolog data base. The example shows how to simulate an assignment statement by using **assert** and **retract** to modify the association between a variable and a value.

```
:- dynamic x/1 .

x(0).          % provide an initial value

assign(X,V) :- Old =..[X,_], retract(Old),
               New =..[X,V], assert(New).
```

Here is an example using the assign predicate.

```
?- x(N).

N = 0
Yes
?- assign(x,5).
Yes
?- x(N).

N = 5
```

Other Useful Syntax

Semi-colon for disjunction:

```
happy(X) :- fed(X),wellslept(X),drydiaper(X)
            ;outside(X).
```