CPCS449 Tutorial

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SWI-Prolog

- Install - https://www.swi-prolog.org
- Start - swipl
- Load - consult('file.pl').
- Quit - halt.
- Debug - trace. / notrace.

Programing in Prolog

Prolog tries to answer the query, that is showing the question can be logically derived from the facts and rules.

- Resolution
- Unification
- Searching and Backtracking

```
/* deduce that Socrates is mortal */
mortal(M) :- man(M). % rule
man(socrates). % fact

mortal(X). % query
man(Y). % query
```

Atom

- strings of letters, digits, and the underscore, starting with a lowercase letter. E.g., haskell2prolog, haskell_Prolog.
- strings of special characters. E.g., ; and , and :- .
- strings of characters enclosed in single quote. E.g., ‘Prolog’, ‘&%#$’.

Number

- Integers. E.g., 1, 2, 3
- Real Numbers. E.g., 3.14, 1.414

Variable

- strings of letters, digits, and underscore character and start with an uppercase letter or an underscore. E.g., X, _unknown, X_751.
- Anonymous Variable: underscore. E.g., _

- fact, rule, query ends with .
- , - and
- ; - or
- not - negate

Prolog list operations

- head
- tail
- my_concat
- remove_one
- remove_all
- nth_element
- my_append
- my_length
- my_reverse
- my_member
- prefix_list
- suffix_list

cut operator - !

We can use ! cut to control backtracking in Prolog.

- it always succeeds.
- it cuts unwanted backtracking.
- it improves efficiency.

cut example 1

What is the output?

```
fact(a).
fact(b).
fact(c).

answer1(X) :- fact(X).
answer1(otherwise).

answer2(X) :- fact(X),!.
answer2(otherwise).
```

cut example 2

What is the output?

```
fact_x(1).
fact_x(2).
fact_y(3).
fact_y(4).
fact_z(5).
fact_z(6).

solve1(X,Y,Z) :- fact_x(X), fact_y(Y), fact_z(Z).

solve2(X,Y,Z) :- fact_x(X), !, fact_y(Y), fact_z(Z).
```

cut example 3

What is the output?

```
fun(a).
fun(b) :- !.
fun(c).

q1(X) :- fun(X).

q2(X,Y) :- fun(X), fun(Y).

q3(X,Y) :- fun(X), !, fun(Y).
```