Prolog Logic Programming

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Outline

Based on

"Logic Programming with Prolog" M. Bramer

Hello World

```
$ swipl
Welcome to SWI-Prolog (Multi-threaded, 64 bits, Version 7.2.3)
Copyright (c) 1990-2015 University of Amsterdam, VU Amsterdam
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software,
and you are welcome to redistribute it under certain conditions.
Please visit http://www.swi-prolog.org for details.

For help, use ?- help(Topic). or ?- apropos(Word).

?- write('Hello World'), nl, write('Welcome to prolog'), nl.
Hello World
Welcome to prolog
true.
```

statistics and halt

```
?- statistics.
% Started at Thu Feb 15 00:18:35 2018
% 0.082 seconds cpu time for 136,679 inferences
% 4,789 atoms, 3,136 functors, 2,211 predicates, 36 modules, 71,764 VM-codes
%
%                         Limit    Allocated       In use
% Local  stack:     268,435,456       61,440        1,968 Bytes
% Global stack:     268,435,456       61,424        8,840 Bytes
% Trail  stack:     268,435,456       30,712        1,536 Bytes
%
% 1 garbage collections gained 35,344 bytes in 0.000 seconds.
% Stack shifts: 2 local, 3 global, 3 trail in 0.000 seconds
% 1 threads, 0 finished threads used 0.000 seconds
true.

?- halt.
$
```

Prolog Program 1

```
--- p1.pl --------
dog(fid)
cat(felix)
animal(X) :- dog(X)
------------------

?- consult('p1.pl').
true.

?- animal(fido).
true.

?- animal(felix).
false.

?- halt.
```

Prolog Program 2

```
p2.pl
-----------------------
dog(fido). dog(rover).
dog(tom). dog(henry).
cat(harry). cat(marry).
cat(bill). cat(steve).
-----------------------

?- consult('p2.pl').
true.

?- dog(X).
X = fido .

?- dog(X).
X = fido ;
X = rover ;
X = tom ;
X = henry.
```

```
?- cat(X).
X = harry ;
X = marry ;
X = bill ;
X = steve.

?- cat(Y).
Y = harry ;
Y = marry ;
Y = bill ;
Y = steve.

?- dog(X), cat(Y).
X = fido,
Y = harry ;
X = fido,
Y = marry .

?- dog(X), cat(X).
false.

?- halt.
```

Data Objects

the data objects in Prolog are called terms

- Numbers
- Atoms
- Variables
- Compound Terms
- Lists
- Other Types of Terms

Numbers

constants with numeric values

- integers
- numbers with a decimal point

Atoms

constants that do not have numeric values

- any sequence of one or more letters, numerals and underscores begining with lower case letter
- any sequence of characters enclosed in single quotes, including spaces and upper case letter
- any sequence of one or more special characters from a list that includes + - * / > < = & # @

Variables

- in a query
  - a name used to stand for a term that is to be determined in query
- in a rule or fact
- any sequence of one or more letters, numerals and underscores
- beginning with uppercase letters or underscore
- anonymous variable : single underscore

Compound Terms

- a structured data type that begins with an atom
- an atom is known as a functor
- this functor is followd by one or more arguments
- arguments in parenthesis and separated by commas
- functor(t1, t2, . . . , tn) n >= 1