CS 420 Advanced Programming Languages
Fall Semester, 2022
Doc 20 Prolog Intro
Nov 3, 2022

Prolog

1972 - Created by Alain Colmerauer

Abbreviation for "**pro**grammation en **log**ique"

Logic programming

Prolog Data Types

Term

Atom
  cat mom 'Roger' 'help me'

Number
  12 32

Variable
  X WhyMe _WhatIsThis

Compound term
  mother_child(sally, tom)
  [1, 2, 3]

atoms verses Variables

Atoms
    Starts with lower case character
    Surround with single quotes if
      Contains space
      Starts with capital letter

Variable
    Starts with capital letter or underscore

Prolog Program

Contains
  Set of facts
  Rules about the facts

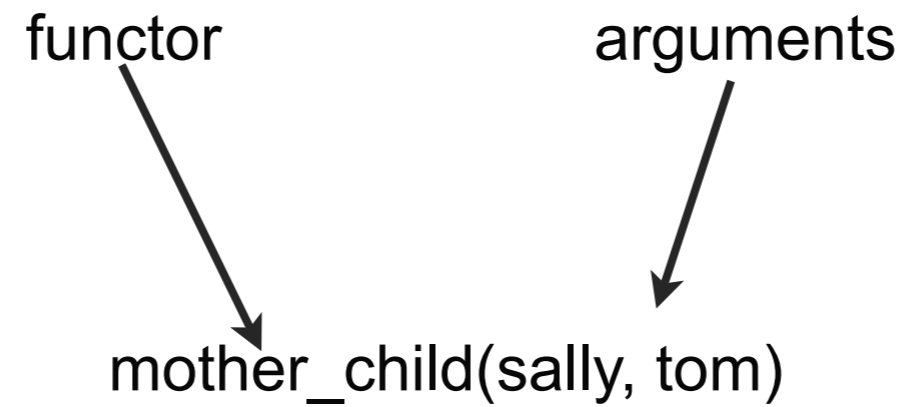We ask questions about rules and facts

Example - Family

Facts and Rules

mother_child(susan, sally).
mother_child(susan, matt).

father_child(tom, sally).
father_child(tom, erica).
father_child(tom, pete).
father_child(mike, tom).

sibling(X, Y)   :- parent_child(Z, X), parent_child(Z, Y).

parent_child(X, Y) :- father_child(X, Y).
parent_child(X, Y) :- mother_child(X, Y).

More Definitions

functor   arguments

mother_child(sally, tom)

functor & arguments are terms

arity - number of arguments

mother_child/2

Semantics

mother_child(susan, sally).

Stating a fact about a relationship between susan & sally

What do we mean when we say

susan is the mother, sally is the child

And Rule

sibling(X, Y)   :- parent_child(Z, X), parent_child(Z, Y).

Or

```
parent_child(X, Y) :- father_child(X, Y).
parent_child(X, Y) :- mother_child(X, Y).
```

Some Questions

```
?- consult(family.pl).
% family compiled 0.00 sec, 64 bytes
true.

?- father_child(tom,sally).
true .

?- father_child(tom,roger).
false.
```

Asking for More Answers

?- father_child(tom,X).

X = sally .

?- father_child(tom,X).

X = sally ;

X = erica .

?- father_child(tom,X).

X = sally ;

X = erica ;

X = pete.

?-

More Complex Questions

?- sibling(sally,pete).
true .

?- sibling(sally,matt).
true .

?- sibling(matt,sally).
true .

?- sibling(matt,pete).
false.

Using A Variable

?- sibling(sally,X).

X = sally ;

X = erica ;

X = pete ;

X = sally ;

X = matt .

Using Two Variables

```
?- sibling(X,Y).
X = sally,
Y = sally ;
X = sally,
Y = erica ;
X = sally,
Y = pete ;
X = erica,
Y = sally ;
X = erica,
Y = erica ;
X = erica,
Y = pete ;
X = pete,
Y = sally ;
X = pete,
Y = erica
```