Logic Programming

Introduction

Temur Kutsia

Research Institute for Symbolic Computation
Johannes Kepler University of Linz, Austria
kutsia@risc.uni-linz.ac.at

"What" vs "How"

Declarative vs Procedural Programming

Procedural programming

- The programmer has to specify how to get the output for the range of required inputs.
- The programmer must know the appropriate algorithm.

Declarative programming

- Requires a more descriptive style.
- The programmer must know what relationships hold between various entities.

Example: List Concatenation

In procedural style:

```
list procedure cat(list a,list b)
{
  list t = list u = copylist(a);
  while (t.tail != nil) t = t.tail;
  t.tail = b;
  return u;
}
```

In declarative style:

```
cat([], Z, Z).
cat([H|T], L, [H|Z]) :- cat(T, L, Z).
```

Logic Programming

- A declarative style programming paradigm.
- Computation through logical deduction.
- Uses the language of logic to express data and programs.
- Most of current logic programming languages use first order logic (FOL).
- Prolog – the most popular logic programming language.

Historical Facts

1970-ies:

- Bob Kowalski.
  "Predicate Logic as a Programming Language".
  IFIP Congress, Stockholm
- Alain Colmerauer and his group.
  Interpreter of the first logic programming language Prolog.
  Marseille

Prolog

- The main subject of this course
- Used in Artificial Intelligence, Natural Language Processing, Automated Reasoning, XML Querying...
- Exists in many dialects (Sicstus Prolog, SWI Prolog, Prolog IV, BinProlog, Ciao Prolog, Prolog LPA, Visual Prolog, YAP Prolog, Strawberry Prolog...)
- (Almost) all the dialects agree on the “core" part (ISO Standard for Prolog)

Useful Links

- SWI-Prolog:
  http://www.swi-prolog.org/
- SWI-Prolog Editor (Windows only):
  http://lernen.bildung.hessen.de/informatik/swiprolog/indexe.htm
- Prolog mode for (X)Emacs:
  http://turing.ubishops.ca/home/bruda/emacs-prolog/
- Prolog newsgroup:
  http://groups.google.com/groups?group=comp.lang.prolog
- Logic programming resources on the web (a good starting point):
  http://www.afm.sbu.ac.uk/logic-prog/