"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.

History

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...
- Exists in many dialects (Sicstus Prolog, SWI Prolog, Prolog IV, BinProlog, Ciao Prolog, Prolog LPA, Visual Prolog, Strawberry Prolog...)
- (Almost) all the dialects agree on the "core" part (ISO Standard for Prolog)