TALK GIVEN ON MARCH 12TH 1934

Quintus

COMPUTER SYSTEMS, INC.

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Quintus - the company

- State-of-the-art symbolic computation systems based on the computer language Prolog.
- Founded October 1983.
- Incorporated February 1, 1984.
- Venture financed.
- Nearing prototype stage

Prolog - the language

- Grew out of research in artificial intelligence
- Based on symbolic logic
- Ideal for tasks involving symbolic computation & knowledge processing:
  - English language interfaces
  - Expert systems
  - Process control
  - Decision support
  - Intelligent databases
- Highly practical programming language

Prolog consists of facts and rules

```
father(isaac,abraham).          mother(isaac,sarah).
father(ishmael,abraham).        father(esau,isaac).
father(jacob, isaac).           father(joseph,jacob).

grandfather(X,Z) :- parent(X,Y), father(Y,Z).

parent(X,Y) :- father(X,Y).
parent(X,Y) :- mother(X,Y).


?- grandfather(X, abraham).

     X = esau ;
     X = jacob
```

Japan's Fifth Generation Computer Project

- Develop computer technology for the 1990s based on Prolog.
- Organized by MITI.
- ICOT: $50 million over first 3 years.
- November 1984: prototype Prolog machine demonstration running at 30,000 lips.
- Highly publicized.

Quintus technology

- Original developers of Prolog compiler technology.
- New, proprietary, compiler technology.
- Quintus Prolog:
  - portable
  - compact
  - very high performance
  - available on today's low- and medium-cost machines

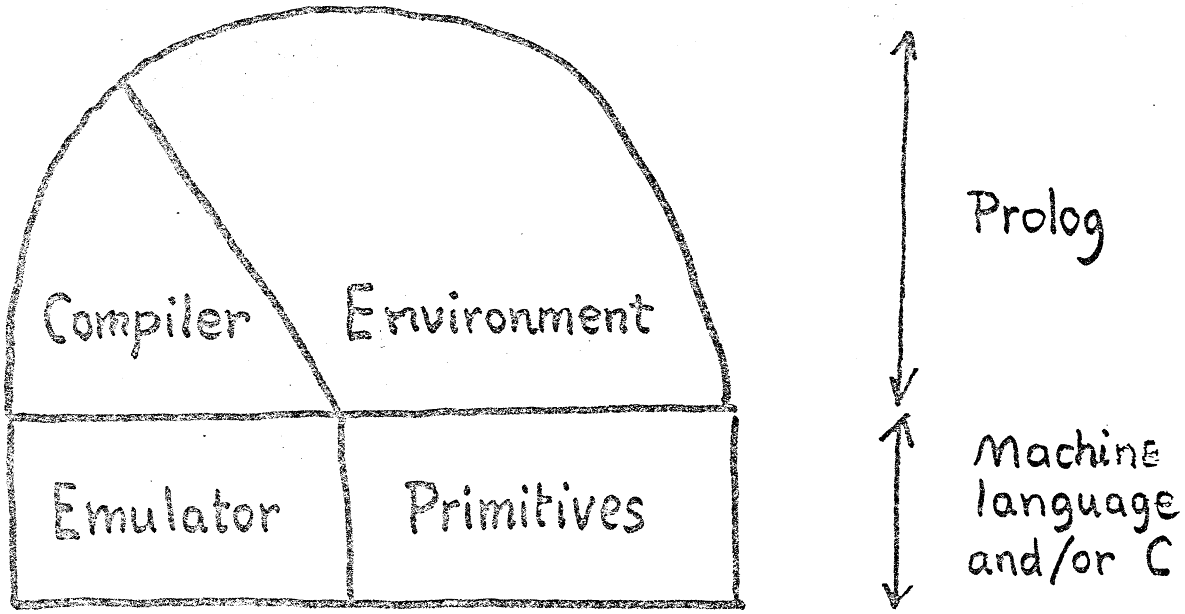
Quintus Prolog

"High performance, integrated, system for symbolic computation"

Goals:

- Performance
- Programming environment
- Integration
- Simplicity and Ease of use
- Portability

Quintus Prolog - components



Performance

- Speed
    - Optimizing compiler to Prolog instruction set
    - Emulator in machine language
    - Tail recursion optimization
    - Indexing of facts and rules

- Space
    - Compact code representation
    - Multiple stacks for run-time storage
    - Tail recursion optimization
    - Garbage collector

Price Performance of Prolog Systems

	Approx. Hardware Cost	Speed in lips	$/lips
Waterloo: IBM 3033	$4 m	33,000	120
Edinburgh: DEC 2060	$1 m	43,000	23
Quintus: VAX 780	$250K	25,000*	10*
Quintus: Sun-2	$30K	15,000*	2*
ICOT: Psi	?	30,000*	?

* Estimates

Advanced Programming Environment

- Incremental "in-core" compiler
- High-level debugger (graphics/windows)
- Good editor interface
- "Meta"-tools

Integration with other software

- Relational databases
- Other languages (C, Lisp, ...)
- Other tools (editors, graphics packages, ...)

Portability + Compatibility

- Quintus Prolog compatible across:
  - 68000
  - VAX
  - other (eg. IBM mainframes, NS 16000)
- Upwards compatible with DEC-10 Prolog
- Prolog in Prolog

Application Areas for Prolog

- Commercial
  - problem solving
  - decision support
  - intelligent user interfaces
  - expert systems
  - Knowledge-based business software
  - database interfaces
  - compiler implementation

- Professional
  - natural language processing
  - artificial intelligence
  - rapid prototyping
  - computer-aided design
  - computer-aided manufacturing
  - system control

- Educational
  - teaching
  - Symbolic computation
  - artificial intelligence research

Quintus - initial target markets

- Universities
  - teaching
  - research
- Research institutes
- Commercial and industrial software development labs, eg.
  - aerospace
  - manufacturing industries
  - financial and banking
- Computer manufacturers' internal R&D
- Artificial intelligence / expert system software developers
- Commercial / business software developers
- Educational / training software developers

Timescales

- Now : product development using VAX and Sun-1s.

- Target : November 1984
  - ICOT demonstrates Psi
  - Quintus demonstrates initial product:
    - integrated system
    - performance comparable with Psi
    - running on widely available workstations

- Shipping of Quintus Prolog to follow soon after.

Marketing

- Quintus Prolog as an integrated part of manufacturers' product lines.

  - Sales through manufacturers

  - Relationships allowing early access to new technology

  - Longer-term possibilities of discussing hardware assistance for Prolog