Quintus Prolog Technical Summary
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Quintus Prolog is a fundamental advance in the technology of intelligent computer systems, incorporating unique advances in functionality and cost-performance. The proprietary design of Quintus Prolog makes it possible to reconcile two hitherto seemingly incompatible goals: the highest cost-performance ratio in the industry, and a high degree of portability.

A further central consideration in the design of Quintus Prolog is compatibility with the most widely used Prolog systems, Prolog-10/20 and C-Prolog, both of which were implemented by founders of Quintus.

Besides compatibility with existing systems, Quintus Prolog also brings improved functionality, and an open-ended design capable of incorporating further advances in both hardware and software technology.

The following chart compares the performance of the two fastest Prolog systems currently available and of the most widely available UNIX Prolog system with the current performance of the two existing ports of Quintus Prolog:

Implementation	Hardware cost	Speed in LIPS	Price-performance in LIPS/dollar	Comparison
IBM 3033	~$4,000,000	33,000	.00825	1.5%
DEC 2060	~$1,000,000	43,000	.043	7%
C-Prolog on Sun-2	~$25,000	800	.032	5%
Quintus VAX-780	~$200,000	19,000	.095	17%
Quintus Sun-2	~$25,000	13,500	.54	100%

where the LIPS figures (logical inferences per second) were obtained on a standard test. Further tuning of Quintus Prolog is expected to increase its speed to around 25,000 LIPS on the VAX-780 and around 15,000 LIPS on the Sun-2. With the introduction of cheaper and faster processors we expect the price-performance figure for Quintus Prolog to grow to at least 1 LIPS/dollar within 6 months and 2 LIPS/dollar within 18 months.

Accurate space performance figures are more difficult to obtain. However, we have tested a large natural-language front-end program and found that the space requirements of this program under both Quintus Prolog, Prolog-20 are well under 1 Mbyte, whereas the same program needs more than 4Mbytes to run on IBM mainframes under the most widely available Prolog system for that class of machines. We expect to have more detailed space figures later. It should be noted that the space occupancy of this application is dominated by data storage. In applications (such as expert systems) where program (rule) storage is dominant, Quintus Prolog is expected to produce more compact code than any other existing system with of comparable speed.

The importance of such performance figures is that the speed of a Prolog

system determines how much of the valuable time of software engineers and end users when developing and testing applications. Also, more complex applications can be programmed and still have an acceptable response time for the end user. A difference of an order of magnitude in performance can make the difference between a successful application and one that is too slow to be seriously used.

As of its first release, Quintus Prolog will be functionally equivalent to Prolog-20 (see attached document), with the following extensions and improvements:

- o Transparent interaction between compiled and interpreted code, allowing the best combination of efficiency and ease of debugging for any given development task.
- o Floating point arithmetic, including all the usual mathematical functions
- o Prolog-20-style four-port debugger with rationalized user interface.
- o Code style checker for earlier detection of programming errors.
- o Multi-window EMACS editor interface allowing simultaneous program editing and execution.
- o Stream-oriented input/output and formatted output facilities for complex result-presentation tasks.
- o Interface to user-supplied application functions written in C or C-compatible language implementations such as Berkeley Pascal and Fortran 77.

A few obsolete or environment-dependent facilities of Prolog-20 (the system predicates `current_functor', `LC', `NOLC', `gc', `nogc', `gcguide', `log', `nolog', `revive' and the mode and public declarations) have been eliminated or superseded by other facilities.