

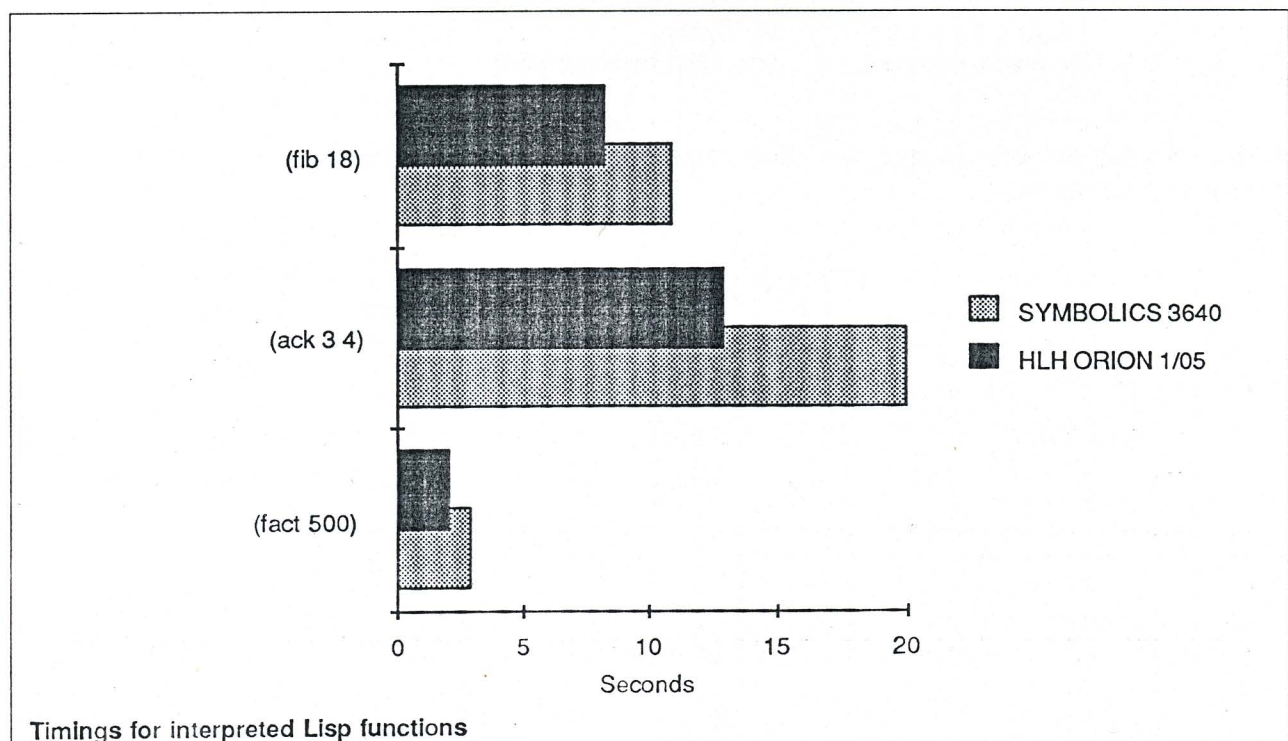
## ORION† 1/05 SUPERMINICOMPUTER

### Common Lisp Benchmarks

This note characterises the Lisp performance of the new ORION 1/05 Central Processing Unit (CPU), an advanced high-performance 32-bit computer architecture which draws on mainframe/supercomputer techniques. The CPU includes an IEEE 754 floating-point unit and two combination cache-plus-memory management units, one for data and one for instructions. It makes extensive use of concurrency, including a sophisticated pipeline and separate buses for instructions and data.

#### The Benchmarks

In order to characterise the performance of the ORION 1/05 running Kyoto Common Lisp (KCL) the three functions *ack*, *fact* and *fib*, were defined. These compute the Ackermann, factorial and Fibonacci functions, respectively. The test functions were timed when executed in both compiled and interpreted form; for comparison, results are also shown for the same tests run in Zeta Lisp on a Symbolics 3640 Lisp Machine. The results shown below for the interpreted forms are measured in seconds.



The definitions of the functions were

```
defun ack (x y)
  (cond ((= x 0) (1+ y))
        ((= y 0) (ack (abs (1- x)) 1))
        (t (ack (abs (1- x)) (ack x (abs (1- y)))))))

(defun fact (n)
  (cond ((< n 2) 1)
        (t (* n (fact (1- n))))))

(defun fib (n)
  (cond ((< n 2) 1)
        (t (+ (fib (1- n)) (fib(- n 2))))))
```

### Tested Configurations

Measurements on the ORION 1/05 system were taken by High Level Hardware Limited whilst those on the Symbolics 3640 Lisp Machine were taken by Dr D Rea, Scientific Computers Limited. Details of the tested systems are

#### HLH ORION 1/05

CPU: CLIPPER (33 MHz)  
Main memory: 8 Mbytes  
Operating system: OTS Release 2.1 (4.2 BSD UNIX)

#### SYMBOLICS 3640

CPU: Proprietary  
Main memory: 4 Mbytes  
Operating system: Zeta Lisp Environment

The benchmarks were run at least three times and averaged, with all times shown in seconds. The final measurements were

	HLH ORION 1/05		SYMBOLICS 3640	
	Comp	Interp	Comp	Interp
(fib 18)	< 0.5	8.3	< 0.5	11.0
(ack 3 4)	< 1.0	13.0	< 1.0	20.0
(fact 500)	1.5	2.2	3.0	3.0

These measurements show that a powerful general purpose computer such as the ORION 1/05 can provide comparable Lisp performance to that provided by the very specialised hardware of a Lisp Machine.

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