The Edinburgh Pure Lisp Theorem Prover (PLTP)

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1. ACL2 Evolved from PLTP

Many of the basic proof techniques and heuristics in ACL2 today were developed by Boyer and Moore in 1972–73 in Edinburgh, Scotland.

Those techniques were first implemented in the Pure Lisp Theorem Prover (PLTP).

PLTP was the first general purpose theorem prover designed for verification.

2. Proof Techniques Pioneered in PLTP

- Lisp as a logic for verification with if-then-else as the logical connective *(see McCarthy)*
- *simplification* – including heuristic expansion of recursive functions in *symbolic evaluation*
- *fertilization* and *generalization* – to set up subsequent inductions
- *induction* – driven by failures of symbolic evaluation

(Ad hoc heuristic approach due to Bledsoe)

3. First Automatic Proofs of Many Classic Thms

- `append-associative`
- `rev-rev`
- `member-union`
- `ordered-sort`
- `count-sort`

4. PLTP Archive:
~moore/best-ideas/pltp

- history, background, differences with ACL2
- listings of original POP-2 source code
- regression suite input and output
- relevant historic documents
- analysis of bugs in the code
- modern reconstructions in ACL2 and OCaml

5. PLTP(A)

- differences with PLTP
- how to play with it

1973

Some World Leaders:

USA	Richard Nixon	Soviet Union	Leonid Brezhnev
China	Mao Zedong	India	Indira Gandhi
Iran	Shah Pahlavi	Israel	Golda Meir
Egypt	Anwar Sadat	Jordan	King Hussain
Philippines	F Marcos	Spain	F Franco
E Germany	E Honecker	W Germany	Willy Brandt

Events: EU founded; Yom Kippur War; Roe v Wade; Vietnam War "ends"; Watergate starts; US VP Agnew resigns

Births: Larry Page; Sergey Brin; Monica Lewinsky

Technical

Popular Programming languages: FORTRAN (1954); LISP (1958); COBOL (1959); Algol (1960)

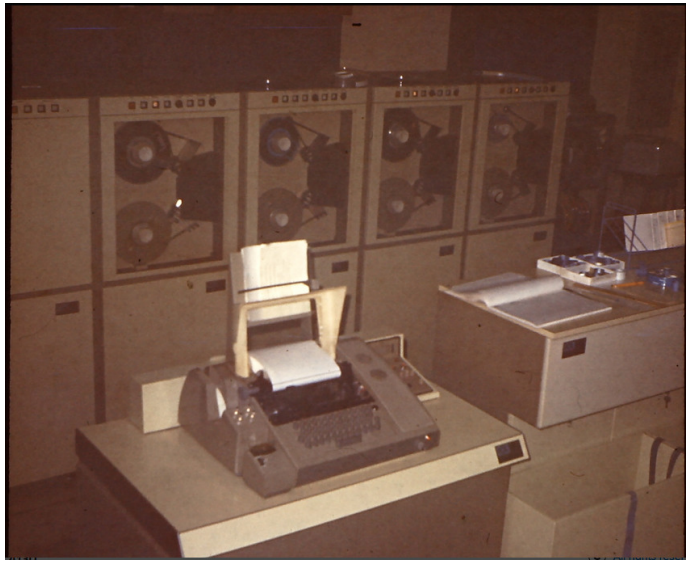
New Languages: C (1972); Prolog (1972)

Formal Methods:

1949 Alan Turing *Checking a Large Routine*
1961 John McCarthy *Basis for a Math. Th. of Computation*
1965 J. A. Robinson *Machine-Oriented Logic Based on Resolution.*
1967 Robert Floyd *Assigning Meanings to Programs*
1969 C.A.R. Hoare *Axiomatic Basis of Computer Prog.*

Theorem Provers: first-order resolution (no general support for arithmetic or inductive reasoning)

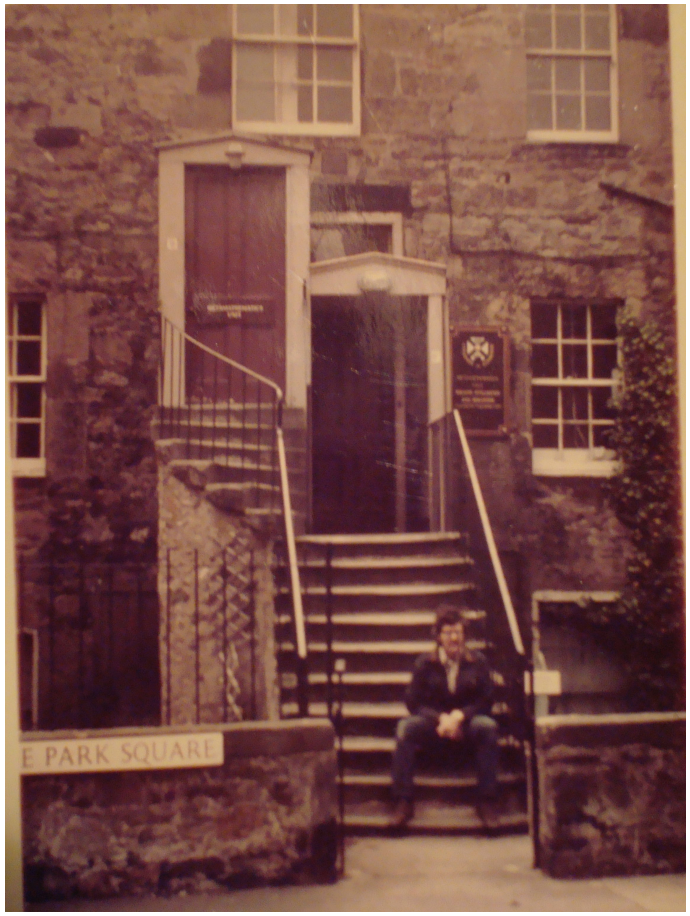
Computing Resources



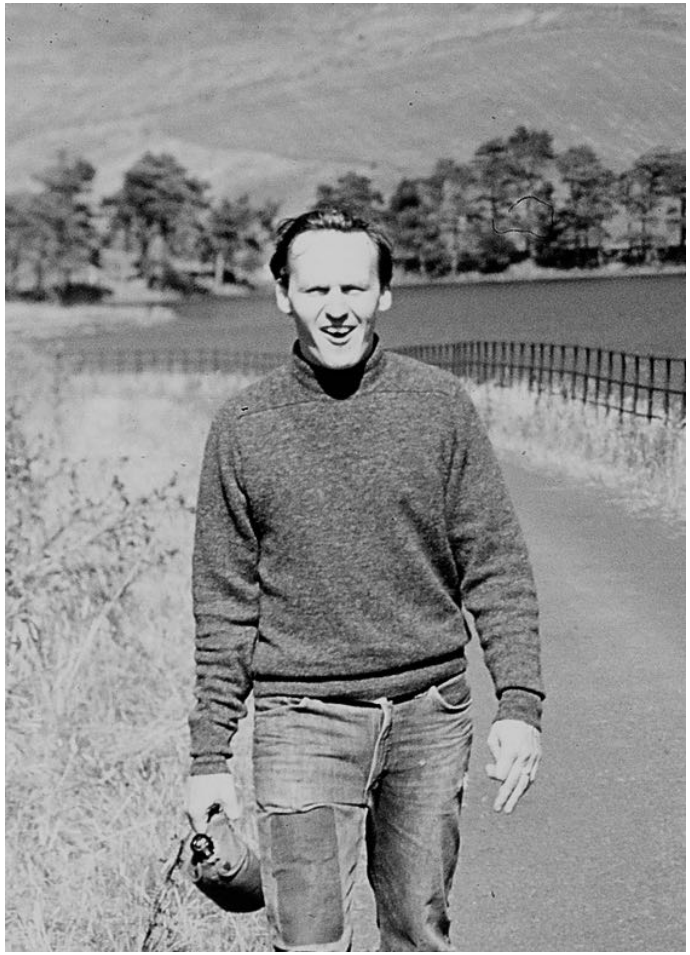
64K of 2 μs core memory
2 paper tape readers
2 paper tape punches
3 4MB disc drives

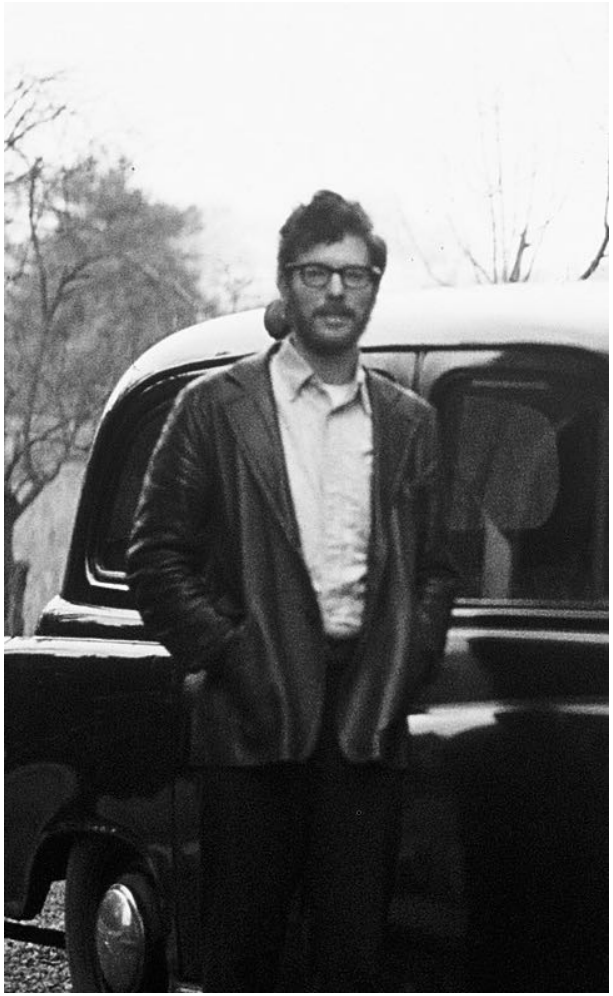
control teleprinter
8 remote teleprinters
1 300 LMP lineprinter

Metamathematics Unit, Edinburgh



Boyer and Moore





Most Important Scanned Listings

- Listing-F and Listing-H: POP-2 code for prover (14 Sep 1973)

- Listing-J: Proveall output (18 July 1973)

Note to Self:
Listing-J, pg 2, pg 18
Listing-F, pg 1
Listing-H, pg 9, 8
Listing-F, pg 14, 5–8
Listing-H, pg 17, 14

PLTP(A): PLTP in ACL2

Note to Self: Shift to ACL2 and play with it as per `pltpa-demo.lisp`