

LISP ACTIVITIES IN JAPAN

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Lisp is one of the major programming languages for AI research. This paper surveys the current status of Lisp activities in Japan. First, Lisp systems developed in Japan on commercial machines are reviewed. Next, projects for Lisp machines are reported with commentary. The current problems and future prospects for the Lisp developments are discussed. We propose that the general educational activities and developments of more powerful portable systems for this language are necessary.

0. INTRODUCTION

Lisp [1] is now one of the major programming languages for AI software development. Some institutions in Japan are said to have chosen their computer systems on the criteria if they have good Lisp systems to promote the AI research. In other words many activities in AI field in Japan indicate that many Lisp systems for AI research have been developed in this country.

In this Paper, Lisp systems developed in Japan are surveyed. First, Lisp systems for commercial machines are listed. Then, the systems for special hardware (i.e. Lisp machines) are reported, some of which are now being developed.

Some problems on Lisp developments are discussed with suggestions for future prospects.

1. LISP SYSTEMS ON COMMERCIAL MACHINES IN JAPAN

No reports have been available on Japanese Lisp systems, except for the reports on the Lisp contests in Japan [2], one of which was held in April 1978 by the working group on symbol manipulation under Information Processing Society of Japan (Kigoshori Kenkyukai). In this contest about 20 Lisp systems participated including 3 overseas systems. The primary purpose of the contest was to know the current status of the art of Lisp systems developed in Japan. However, there existed some problems, as Eric Sandewall pointed out [2], that the benchmark programs for the contest were not appropriate especially from the viewpoint of AI

applications, and that some systems were not included in the contest.

The reported items are as follows: system's name, authors, their institution, dates for first and current version installed, primary purposes, its resemblance, its service, the number of users, the number of Lisp system functions, its top level function, its data types available, the number of cells, stack, compiler status, program size, its hardware systems, memory size, the number of general registers, CPU cycle time, time for add (memory to register), operating systems, version-up schedule and other information. The report also contains the execution time of several test programs, which are cited at many places for performance evaluation.

Tables 1,2,3, and 4 contain the list of the existing Lisp systems in Japan. Table 1 lists the portable systems, Table 2 big and medium machines, Table 3 for small machines and Table 4 shows the micro-processor based systems.

The Tables contain only the system's name, authors, their institutions, hardware systems, and the main features. The imported Lisp systems such as Interlisp, UCL-Lisp, Standerd-Lisp and MacLisp are not included.

The followings should be noted:

- 1) Most of the systems have been recently implemented (during 1975-1978.)
- 2) Portable Lisp systems are implemented on

Tables for Lisp Systems on Commercial Machines in Japan

System name	Author	Institution	Hardware	Features
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Table 1. Portable Lisp System

HLISP	Y.Kanada et al.	Univ. of Tokyo	HITAC-8800/8700	Written in Fortran
LISP/P	T.Chikayama	Univ. of Tokyo	FACOM-230/75 IBM-370/168	Written in Pascal
TLICS	M.Suzuki et al.	Tohoku Univ.	FACOM-230-38 ACOS-6	Written in Fortran

Table 2. Lisp Systems on Big Machines

LISP 1.5	H.Kumura	Okayama Univ.	MELCOM COSMO-700	TSS
OLISP	H.Yasui et al.	Osaka Univ.	ACOS-77 System 800 System 900	
PETL	M.Tsukamoto	ETL	MELCOM COSMO-700II	TSS
TOSBAC-5600 LISP 1.9	T.Kurokawa	Toshiba Co.	TOSBAC-5600 ACOS-77	TSS
VS-DLISP 1.5	H.Imura	Doshisha Univ.	HITAC 8350	

Table 3. Lisp Systems on Small Machines

FLISP	N.Abe et al.	Osaka Univ.	HP2108A	Hardware modified
HITAC-10 LISP	Y.Nakamura	Keio Univ.	HITAC-10	Hardware modified
KLISP-11	M.Nakanishi et al.	Keio Univ.	PDP-11	
LIPQ LIPX	I.Takeuchi & H.Okuno	ECL of NTT	PDP-11/55	Parallel 4-Cell
LISP 1.7	K.Hiramatsu et al.	Kyoto Univ.	FACOM U-200	Hardware modified
LISP 38	Y.Ohta	Nagoya Univ.	FACOM 230-38	
NIT LISP-U	T.Niwa et al.	NIT	FACOM U-200	

Table 4. Lisp Systems on Micro-computers

LISPM	T.Chikayama	Univ. of Tokyo	INTEL 8080	
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Fortran or on Pascal.

3) Many systems are implemented on small computers, some with hardware modifications for commercial machines.

2. LISP MACHINE PROJECTS IN JAPAN

At the time of April 1979, there are 6 Lisp machine projects reported in Japan. The implementors, machines, principal purposes and progress atatus are listed in Table 5.

There are many kinds of approaches for Lisp machines projects: FLATS by Goto[3] is a special purpose machine (Formula manipulations). Fortran and Algol can also run on that machine. ECL(Electro Communication Lab. of NTT) machine [4] is made to experiment the parallel garbage collection. Although the feasible result was not obtained, it has provided Lisp engineers with the valuable information. ALPS/I[5,6] is one of the earliest Lisp machine in the world, and the significant revision is now considered. NK3 made by Kyoto Univ. [8,9] utilizes 32-bit

mini-computers and is used for large natural language processing programs. ETL(Electro-technical Laboratory) [10,16] is trying to make a Lisp machine on a chip. (It will really be on a few chips.) They use LSI microprocessors produced by a national project, PIPS. (Pattern Information Processing System)

A Kobe machine[7,11,12,13,] is rather in expensive but is very fast. Its interpreter runs as fast as the compiled Lisp programs on a big machine, although its address space is rather limited (16 bit). Keio Machine[14,15] is a Lisp system on an experimental multi-microprocessors.

3. PROBLEMS AND FUTURE PROSPECTS

The author would like to point out the following two problems: one is for education and the other is for computing facility.

i) Education As Lisp is (seemed to be) tied up with the AI programs, those who do not study AI, have a tendency to neglect Lisp for the

Table 5. Lisp machine projects in Japan

Implementor (Institution)	Machine	Purpose	Status (April 1979)
E.Goto et al. (Institute of Physical and Chemical Research)	FLATS	Formula manipulation	Design
Y.Hibino (ECL of NTT)	Tosbac-40L	Parallel GC	Working/Data Gathered
M.Ida et al. (Aoyama Gakuin Univ.)	ALPS/I using Intel 8080	General (esp. formula manipulation)	Working from 1977
M.Nagao et al. (Kyoto Univ.)	NK-3 using Interdata 8/32	AI esp. for natural language processing	Working/Data Gathered
T.Shimada & Y.Yamaguchi (ETL)	PULCE	PIPS	Design Finished
K.Taki et al. (Kobe Univ.)	using Am 2903	General	Working/Data Gathered
T.Usuki et al. (Keio Univ.)	Multi-micro computers	General	Working

programming instruction. From the author's viewpoint, however, we should promote the Lisp programming instructions not only for the wide activities of AI, but for the better understanding of the computer science. We also need a good organization for Lisp instructions.

ii) Computing facility-Interactive programming and cooperative program development are two vital elements for the present software development, especially on AI. Utilization of time-sharing services have been the easiest way to experience them. But TSS are rare in Japan even today. In fact, some of the Lisp machine projects are motivated in order to have an interactive facility for Lisp. Even if you are doing research by yourself in your own style, you should promote to have a center machine with time-sharing services and should provide a network facility to communicate with others.

The author would like to discuss some future prospects for Lisp developments in Japan.

i) Although many Lisp machines have been developed good portable Lisp systems are indispensable to meet a wide variety of users and their applications.

ii) Memory-neck problems will be solved by the recent 32-bit architectures. A portable Lisp on 32-bits hardware(eg. Interdata 8/32, Tosbac 7/70, and DEC VAX-11) and a special purpose Lisp machine will be good competitors.

iii) Database facilities are necessary for large AI applications.

iv) Parallel processing facilities are needed, since the techniques for parallel processings are now accumulated. The AI applications such as many worlds hypothesis are utilizing parallelisms.

v) For the AI applications in Japan, most users need the Japanese language interfaces. Thus, Kana and Kanji characters should be handled by Lisp. The general pattern handling facilities are also preferable.

vi) Modularity of Lisp programs encourages to involve special features useful for AI, eg. Pattern matching, context switching, etc.

vii) Recently Lisp has become more popular than before. It is studied now in the software engineering fields as well as AI and the mathematical computer science. However, it is still a research language(at least they say), and its application and education are rather limited.

As AI applications are widely recognized as feasible, Lisp implementors should note the practical aspects of the Lisp language. From the author's viewpoint, Lisp may be regarded as a system language for high-level application programs.

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