A VISIT TO ICOT

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Mike Reeve

Department of Computing
Imperial College
180 Queens Gate
LONDON, SW7 2BZ
ENGLAND

INTRODUCTION
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I was invited to ICOT to discuss the compilation of the KL1 Core
Language, Guarded Horn Clauses (GHC) to the ALICE Compiler Target
Language (ALICE CTL).

Like the ALICE Project, ICOT wishes to investigate a number of
language proposals (AND-Parallel, OR-Parallel, etc.) and a number of
machine proposals (PIM-D, PIM-R, etc.) concurrently. The language /
machine interface provided by ALICE CTL was of great benefit to the
ALICE Project when it was faced with a similar dilema. So ICOT wished
to investigate whether ALICE CTL or some generalization of it could be
used to interface between KL1 and PIM. For my part I wished to
recieve ICOT's comments on how to improve the generality of ALICE CTL.

Thus my primary activities were to give a presentation on ALICE CTL
to ICOT and take part in a number of discussions with the KL1 Group,
led by Akizaku Takeuchi, regarding the compilation of GHC to ALICE
CTL.

I also wished to use the trip to get an update on ICOT's progress
since my visit at the time of the FGCS 84 Conference last November and
to update my Japanese colleagues on the progress of the Experimental
ALICE Machine.

ICOT AND THE EXPERIMENTAL ALICE MACHINE UPDATES
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ICOT were very happy to provide me with an update on the recent
progress of their language and machine research. Accordingly I spent
much of the visit receiving presentations. They also arranged
presentations from several outside groups.

In addition both ICOT and the outside groups were keen to hear
about the Experimental ALICE Machine so I gave a number of
presentations describing its architecture, implementation and the
lessons that have been learnt during its development.

We are all at the begining of long and diverse research programmes
so I think that the interchange of experience was of great benefit to
both of us.

KL1

Kazunori Ueda presented the KL1 core language, Guarded Horn Clauses (GHC), to me.

I was encouraged to find that GHC had moved away from Concurrent Prolog (CP) and towards PARLOG. I believe that the semantics of CP has a number of problems and I have not yet seen a convincing proposal for its efficient implementation on a parallel machine. I think that GHC is altogther more satisfactory.

SIM-C

I was fortunate enough to be able to visit NEC's Central Research Laboratory where SIM-C is being developed. I was given a very thorough presentation covering its design philosophy, architecture, system configuration, programming language and programming environment by Akihiko Konagaya. I was also shown the hardware being commissioned.

I gave a short presentation describing the Experimental ALICE Machine and outlined the lessons that have been learnt during its development.

Konagaya-san and I also had some interesting discussions on the general problems of building parallel reduction machines and extending declarative languages to allow them to be applied to 'real world' problems.

M-SIM

Kazuo Taki gave me a short presentation on the research objectives and the design philosophy of the M-SIM Project. I think that this is a very interesting project and its philosophy is very similar to my own ideas for future parallel machine research (see OBSERVATION below).

I described the Experimental ALICE Machine to him and we discussed the lessons that have been learnt during its development.

PIM Research and PIM-R

Rikio Onai, leader of the PIM Group, gave me an overview of ICOT's PIM research and the details of the experimental PIM-R machine currently being commissioned. At the end of my visit we had a very stimulating discussion regarding the future of PIM research.

We had a number of discussions and it seems that we hold many similar views on the future directions for programming language and PIM research (see OBSERVATION below).

PIM-D

Noriyoshi Ito provided me with a detailed description of the experimental PIM-D machine currently being commissioned.

Fujitsu

I gave Yukio Soma and three of his colleagues two presentations. One on ALICE CTL and the other on the Experimental ALICE Machine and the lessons that have been learnt during its development.

Soma-san gave me a brief overview of the PIM research being conducted at Fujitsu. I was told that their experimental machine is now operational, so I look forward to seeing the data gathered from their experiments. Particularly since their ideas are similar to my own (see OBSERVATION below).

Unfortunately my time in Japan was too short to accept their invitation to visit their laboratory.

Tokyo University

Toru Moto-oka's group at the University of Tokyo are developing a parallel inference machine known as PIE. Last November I was able to visit their laboratory and was given a demonstration of the Unification Processor (the core of PIE's building block the Inference Unit). Hitoshi Aida gave me details of the experimental version of the Inference Unit now being commissioned.

OBSERVATION

I am currently of the opinion that the unit of parallelism of most of the current parallel machine proposals is too small. I now believe that a practical parallel machine can only be constructed by connecting together a small number of high performance processors and having a large unit of parallelism. Currently most researchers advocate a very large number of low performance processors and a very small unit of parallelism.

It seems that the experiences of Onai-san (PIM), Taki-san (M-SIM) and Soma-san (Fujitsu) have led them to the same conclusion.

THE COMPILATION OF GHC TO ALICE CTL
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The KL1 Group, Ito-san (PIM-D) and I had a number of discussions. We found that GHC could be compiled to ALICE CTL in a straightforward manner. My visit was too short to implement a compiler so we simply documented the general framework of the compilation scheme (see separate technical report).

The ICOT researchers provided valuable comments on the generality of ALICE CTL and how it could be improved.

FUTURE COLLABORATION
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I believe that because we have only just started down the path of Fifth Generation Computing and the direction that should be taken is still so unclear we should collaborate widely on basic research. Otherwise with such a worldwide shortage of expertese the jouney's end may be further away than we hope.

I think ICOT's philosophy of making the results of its research
widely available via its own publications and its organization of and
participation in international conferences and workshops is a clear
indication of its openness and its desire to make an international
contribution to scientific knowledge. As is its scheme whereby
overseas researchers visit ICOT to collaborate with its researchers. I
think we all benefit from such policies.

From a personal point of view I would like to continue to
collaborate on the generalization of ALICE CTL and the architecture of
parallel machines. I believe that at the technical level ICOT is
enthusiastic for this to be so. However, we do not know what the
plans of our respective governments will permit.