Another Visit to ICOT

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1. Introduction

ICOT has constructed experimental machines for the three approaches to the parallel evaluation of logic programs selected for consideration. Also we, in the ALICE Project, have recently completed the Experimental ALICE Machine.   At present we are all evaluating the results of our experiments. I was invited to ICOT by Shun-ichi Uchida (head of the 4th Laboratory) and Atsuhiro Goto (Leader of the PIM Group) to exchange experiences and ideas with the PIM Group resulting from our research on parallel machines for declarative languages and the experiments we have conducted on our experimental machines.

I spent a rather hectic two weeks having discussions with ICOT researchers, visiting industry and university research groups and giving two presentations to ICOT (and, thanks to the many friends I have made in Japan, taking part in much socializing!).

2. Visits to Industry and University Laboratories

At the time of my visit one year ago, ICOT's three experimental PIM machines were just being commissioned and the Experimental ALICE Machine was waiting for the INMOS T414 Transputer. Since then ICOT's machines have become operational and many experiments have been performed on them. So too with the Experimental ALICE Machine.

Goto-san arranged for me to visit the laboratories of Fujitsu, Hitachi, and Oki where the three experimental PIM machines (Kabu-wake Method, PIM-R and PIM-D

respectively) are located. So that we could update each other on our progress during the last year. At each laboratory I received a presentation and demonstration of their machine and gave a presentation on the Experimental ALICE Machine. We also had some very interesting discussions on the initial results we had obtained from our experiments.

At the University of Tokyo the group of Professor Moto-oka are developing a very interesting parallel machine for the execution of logic programs called PIE. At the time of the FGCS 84 Conference Professor Moto-oka arranged for me to visit his laboratory and see PIE in its early stages. Goto-san arranged for me to visit the laboratory again and see the progress that had been made.

I was saddened to hear of the death of Professor Moto-oka. We had met on a number of occasions in England, Japan and at conferences around the world and had always had interesting discussions. I think his death is a great loss.

3. Presentations to ICOT

I gave two presentations to ICOT. I enjoy giving such presentations because the ICOT researchers always ask interesting questions. Also I was glad to notice this time that they are becoming more accustomed to the Western style of interrupting and asking questions during the presentation, instead of politely waiting until the end!

In the first presentation I gave an overview of the ALICE Project, described the architecture of the Experimental ALICE Machine and outlined our current status and future plans.

In my second presentation I gave an overview of the Alvey Programme and the projects in which the ALICE Group is participating. I also gave a very personal comparison of the Japanese FGCS Project and the Alvey Programme. We concluded by discussing my impressions of ICOT and its plans.

4. Discussions with ICOT Researchers

I spent many fruitful hours in discussion with Atsuhiro Goto, Kazuaki Rokusawa and Masatoshi Sato of the PIM Group and Kazuo Taki, leader of the multi-PSI Group. Goto-san gave me an overview of PIM research at ICOT and Rokusawa-san gave me a detailed presentation of the experimental PIM-D machine and the results obtained from the initial experiments. Taki-san gave me an overview of progress made on the multi-PSI Project. We (ICOT and the ALICE Group) both now have experimental machines operational and are looking towards the next step. We have made many observations of the behavior of our experimental machines and have many untried ideas for the future. In our discussions we were able to cross-check our experimental results, compare the conclusions we had drawn from them and get another opinion on our new ideas. We found much overlap between our conclusions and future ideas.

5. Conclusions

I think the discussions I had with the PIM Group and the groups that developed the three experimental PIM machine have been very useful for all of us. It is still very early in the life of PIM research and there are still a large number of very difficult problems to be solved, so discussion between the various groups is not just beneficial but possibly absolutely vital if we are to solve many of the problems as quickly as the funding bodies and commercial concerns supporting our projects would like. I hope that we will be free to continue much discussions for many years to come.

I think three features of ICOT's organization make it so special and so successful. The first is that the project is pursuing one vision of the future. Such a coherent plan means that all the research is integrated and supportive.

The second is that the activity is focused at a central laboratory. Personally I believe this is the most effective conduct collaborative research.

This is because I believe that the most significant benefits do not come from formal meetings but during the causal interdisciplinary discussions that arise over tea or at meal times in such an environment.

The third is the policy of open research. There are so many difficult problems to be solved before we can build a FGCS that the computer science community must work as one, now is not the time to divided into commercial factions.

I think my major worry about ICOT can be summarized by the question : is the work too bottom-up? I feel that machines are being built and languages designed in isolation from the applications that will be implemented with them. Perhaps it would be beneficial if ICOT took a pause and considered the problem top down. Ask : what is the nature of the applications that will be built on a FGCS? what language features do such applications require? what machine should be built to implement such languages efficiently?

I also have a worry about the structure of ICOT. It seems to me that the divisions between the laboratories may be too strict. I think there should be much interplay between the applications writers, language designers and machine builders.

Another concern that I have, and one for which I cannot suggest or answer, is that as ICOT grows the best researchers are prevented from doing research by the burden of management activities.

6. Acknowledgments

I would like to thank Kazuhiro Fuchi for his policy of open research at ICOT that enables overseas researchers like myself to visit ICOT. I think this benefits the international computer science community greatly. I am most grateful to Shun-ichi Uchida (head of the 4th Laboratory) and Atsuhiro Goto (leader of the PIM Group) for invitng me to ICOT and arranging such an

interesting schedule.

Special thanks are due to Goto-san, Kazuaki Rokusawa and Masatoshi Sato of the PIM Group for many enjoyable and productive discussions. Rokusawa-san and Sato-san were also kind enough to guide me on my visits to outside laboratories (such kindness also allowed them to see the experimental PIM machine for the first time as well!)

As with my last visit Hiroyuki Kusama of the research planning department ensured that the ICOT paperwork caused me no problems, my transactions at the bank ran smoothly and that yet again my hotel room had a fine view of the ICOT building.

Finally, I wish to thank the many ICOT researchers and Nobuko Serizawa and Yumiko Okada who made my social life as enjoyable and exhausting as the research work!

I must also thank ICOT for the coincidence of inviting John Lloyd (University of Melbourne) at the same time as myself! This enabled me to catch up on his recent work and enabled us to renew our acquaintance.

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RESEARCH INTERESTS

    Declarative Computer Systems :
      Applications, programming languages, program development tools
      and computer architectures
    Software Engineering :
      Specification languages, problem decomposition,
      the programming process and programming support environments
    The Man Machine Interface

PROFESSIONAL EXPERIENCE

Company Director :
  The ALICE Company Limited and Mouse Enterprises Limited
Research Assistant, Department of Computing, Imperial College :
  Research on Declarative Computer Systems (ALICE Project)
Design Engineer, IBM United Kingdom Laboratories Limited :
  Logic design and microcode design and implementation

ACADEMIC COURSES

(1976 - 1979) B.Sc. Computer Science, Imperial College
(1979 - 1982) Ph.D. Computer Science, Imperial College

PUBLICATIONS

(Coauthor) 'SONET : A Low Cost High Function Network',
  Presented at the NETWORKS 84 Online Conference, 1984
(Coauthor) 'SONET : A Simple Open Network',
  Presented at the 8th Annual University of Liverpool Workshop
  on Microcomputer Applications and Microcomputer Networks, 1984
(Coauthor) 'ALICE and the Parallel Evaluation of Logic Programs',
  Invited Address at the ACM / IEEE 10th Annual International Symposium
  on Computer Architecture, 1983
(Coauthor) 'UK Patent Application GB 2 107 497 A',
  (ALICE), 1982
'An Introduction to the ALICE Compiler Target Language',
  1981
(Coauthor) 'ALICE : A Multi-Processor Reduction Machine for the Parallel
  Evaluation of Applicative Languages',
  Presented at the 1981 ACM / MIT Conference on Functional Programming
  Languages and Computer Architecture, 1981

OTHER EXPERIENCE

Member of Declarative Compiler Target Language Design Group
  of Alvey Programme
Member of 5G Architecture Strategy Group of Alvey Programme (1984)
Visiting Lecturer at Universite Catholique de Louvain, Belgium (1983)
Member of Advanced Information Processing Programme Planning Panel
  of ESPRIT Programme (1983)
Author of the first game playing program playing a game not involving
  chance (Othello) to defeat the game's human world champion (1980)