

A Report on My Visit to FGCS'92

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Summary:

I attended FGCS'92 at the gracious invitation of representatives of ICOT. I was invited to participate in a panel on the topic of computing in the 21st century, and then later I was invited to also participate in a workshop to evaluate the FGCS project.

Since I have for a number of years admired the vision and goals of the FGCS project, I felt honored by the invitation. In this report, I will try to honestly and constructively report on my view of the achievements of the project, along with some comments on the future direction of the project.

Achievements:

The project's achievements can be grouped into three categories:

1. Those relating to the general advancement of logic programming.
2. Those relating to the specific advances in software relating to an environment to support parallel processing.
3. Specific applications built upon the systems.

General Advancement of Logic Programming:

By committing such a sizable project to a technology based on logic programming, the Japanese immediately had a serious impact on the computer science research community. Their commitment to this technology elevated interest and a general recognition of its role in knowledge representation, parallel processing, and database technology. This produced sizable research projects in the USA, Europe, Korea and elsewhere to explore the technology.

My contacts with the Japanese have been far more limited than with Europeans, so my impressions may be inaccurate. However, I believe that the attempt to coordinate efforts on the project with foreign researchers has benefited both the Japanese effort and the other projects worldwide. It has, in my case, started a number of interactions that will continue well past the end of the project.

I have found it a difficult process to establish meaningful research relationships with Japanese logic programmers, and I am sure that they have found it even more difficult (the asymmetry of the relationship, with Japanese being willing to learn English, to

understand our culture, etc., while people like myself take only a limited amount of time to reciprocate, must surely cause some problems). Yet, I cannot help but believe that the contacts initiated by the FGCS project will gradually produce a lasting benefit.

Specific Advances in the Area of Parallel Processing:

The development of PIMOS, the five PIMS, and the associated applications environment is a major achievement. In the case of parallel processing, I believe that it is likely (but far from certain) that the ideas pioneered by ICOT will play a central role in the eventual software environments to support applications development. In Europe and America, these ideas have emerged in the Strand and PCN efforts.

The development of PIMOS could lead to a commercial success, if it is successfully moved to general-purpose MIMD machines, and if it widely adopted.

In an incident that I deeply regret, I was quoted out of context by a reporter, and the quote was used in an article critical of the ICOT effort. What I regret is speaking to the reporter; he chose to completely misrepresent the basic intent of my remarks that evening. During the day, MITI had announced that it would make the software developed at ICOT freely available. I have consistently taken the position that ICOT should make the software available, that it must be ported to general-purpose machines before it is could possibly be of any commercial significance, and that it would benefit the Japanese to get the software in use. It should be released free of charge as the first step in attempting to build an effective solution to the problem of applications development for parallel processors; the commercial payout of such software will never be achieved, if it is not first widely adopted. I pointed out the sequence of events leading to the gradual adoption of UNIX to illustrate what I believe would be the correct strategy for allowing the software to attain its potential value. The tone and content of my remarks, as they were reported, were both rude and inappropriate. I do not believe that I ever spoke them (although I do believe that I expressed the opinion represented by the quote). In any event it was very foolish to place myself in a position where I might cause such misunderstandings, even unintentionally.

I do believe that the software and pool of experience represented by PIMOS is a substantial asset developed by the project.

Advances in Application Areas:

In general, I believe that too little emphasis was placed on building the best versions of applications on the machines (as opposed to demonstration versions).

However, I have been quite impressed with several specific areas. First, in the theorem-proving work (which I did not expect to result in substantial advances), the team did develop a system that proved an open theorem and another system that could prove a set of difficult theorems that clearly established the group as very serious indeed. For a group of relatively inexperienced young researchers to have attained this level of achievement in such a short time is quite remarkable. They have done more

in a short time than many larger international groups have achieved over much longer periods.

In addition, I noted that the effort to integrate data from a variety of biological databases could offer a foundation for a serious advance in science (but has not yet progressed to that point). When I reflect on what has been done in a fairly short time, and upon the difficulties in communication between computer scientists and biologists, I cannot help but believe that a great opportunity still exists in this area. The Japanese are in a position to play a significant role in what will certainly become one of the most significant areas of scientific research during the coming decades.

General Reflections:

I have always viewed the Fifth Generation Project as fundamentally heroic. I am astounded that five distinct PIMs were actually produced, that a complete operating system with associated tools was completed, and that a serious attempt was made to apply this technology. I vividly remember being in an audience when an American researcher lectured an audience that included members of ICOT on the topic of software engineering, basing his comments on experiences writing programs of 2000 lines or less. A number of us found this truly strange, given the enormous effort that went into the large systems developed at ICOT, yet unfortunately typical.