PREFACE

Introduction

The fourth in a series of International Conferences on Accelerator and Large Experimental Physics Control Systems was held at the Swissôtel in Chicago from October 30 to November 3 1995. This series had been preceeded by a number of conferences on accelerator control systems dating to 1983, and it had later been decided to widen the scope to include other large experimental devices, such as telescopes, tokamaks and high energy physics experiments themselves, which have similar control problems.

The pre-conference announcements and circulars emphasized that certain aspects of the field would receive more stress at this conference than in the past. These areas were controls hardware; non-accelerator control systems, particularly those of physics experiments and telescopes; and operational aspects of controls. Oral sessions were devoted to each of these topics, two sessions in the case of hardware. Additionally, the topic of the opening plenary session talk was operational aspects. At a meeting held just after the conference closing the International Scientific Advisory Committee expressed the viewpoint that emphasis in these areas should be continued in the future. This will require particular effort in the areas of physics experiments and telescopes, where ICALEPCS is still not well known. At the same meeting the committee was divided on the value of continuing parallel sessions, which were held in Chicago for the first time.

Paper breakdown by topic

It is interesting to note the breakdown of the papers at this conference. The record 195 contained in these Proceedings have been categorized, including each paper no more than twice, as the following:

Accelerators	105
Physics experiments	17
Telescopes	5
Hardware	18
Operations	11
EPICS	12
Commercial and industrial	19
User interfaces	12
Distributed computing	12
AI and advanced techniques	9
OO techniques	11
Databases	7
Software sharing	3

The breadth of this distribution, as compared with that at early conferences, is notable and, speaking for the organizers, gratifying. A major new trend was noticed in the contributed papers - 36 of them could be classified as 'Control of subsystems.' A large fraction of these pertain to the extension of an existing control system to a new area, the upgrading of one part of an overall system, or control support for extension of machine functionality. The ability to make such changes indicates a major strength of the control system 'Standard Model', namely that it is modular and that additions or changes can be made in particular areas and then easily integrated into the overall system.

Commercial systems

One general impression of the progress presented at this conference is the greater readiness to adopt both hardware and software coming from outside the immediate community. There are several reasons for this. One is that the controls industry can now provide systems that meet the requirements for the control

of many components, not just utilities, from their standard lines. Another is that many laboratories are suffering from reductions in staff and can no longer indulge in the luxury of in-house development.

Several papers show that such imports can be used with advantage for reducing the amount of in-house effort required in providing for the control of many of the support systems needed for an accelerator, but that they do have limitations. Many commercial control systems use proprietary networking and require their own separate networks. This may not create a major problem for small machines, but may involve extra expense for large ones, particularly if competitive tendering results in different suppliers for some of the subsystems. Commercial systems are not usually able to cope with the sub-millisecond timing required for instrumentation and RF.

Sharing of Software

As was the case at the 1993 ICALEPCS, a one-day workshop on the topic of sharing control system software was held after the completion of the conference. Compared with the first formal discussion at ICALEPCS 91, considerable progress in software sharing (SOSH) has been made. The EPICS collaboration, plus some smaller groupings of European laboratories, exists explicitly for this purpose. As is often pointed out, purchase of commercial software products as noted above is also a mode of sharing development costs. However some major laboratories, with large in-house-developed proprietary control systems, effectively cannot participate via such channels.

The conclusion of a previous workshop was that where sharing would have the most impact is in the matter of application software. There has been developed at CEBAF a product called CDEV which could serve as an interface between different application programming schemes on a high level and different control infrastructures and protocols on a lower plane. Several laboratories have investigated the possibility of such a product to interface their software to that of others and the results appear promising, although with obstacles. A major part of the Chicago workshop concerned specific detailed matters which would be involved in implementing such a scheme.

A separate effort involves sharing at a lower level in the controls model, namely a protocol at the level of the network or hardware bus serving similarly as a software bus. These discussions center primarily on the use of the CORBA method of object oriented communications. Such investigations continue.

On site computer center

One of the interesting features of the conference was the computer center which was constructed in the Swissôtel, primarily by members of the Fermilab Computer Division, for the use of all conference attendees and exhibitors. This center consisted of Macintosh and PC computers plus high end X-terminals, printers and a scanner. All were connected by an Ethernet LAN, with some wireless nodes attached. Wide area networking via a T1 link provided adequate bandwidth for the remote operation of various control systems. Some of the 'poster' presentations were actually made on X-terminals with outside connections. Additionally a projection system with connection to a computer or terminal at the podium allowed the visual aids of oral presentations to exist on computer screens, as opposed to transparencies. One of the hotel employees expressed surprise that for a technology conference this option was chosen by relatively few presenters. His remark can stand as a challenge to organizers of and presenters at future ICALEPCS.

Proceedings on CD-ROM

These Proceedings have been prepared in both paper and CD-ROM versions, 40% of the attendees having chosen the former and 60% the latter. It is clear that given the nature of the material we have received, CD-ROM is the more appropriate medium for this conference. Many authors have included detailed or colored figures and photographs, which are only approximated in the paper version. Additionally, the

papers in a form appropriate for CD-ROM were also automatically appropriate for the World Wide Web, and thus were able to begin appearing in their final form within a month of conference completion.

Some comments on technical matters concerning the papers are appropriate. The instructions for authors sent before the conference stated rather explicitly how text was to be handled. As a result there were only minimal problems in preparing the text parts of papers for electronic media and with a consistency of format. However the same is not true of figures. These have been produced using a wide variety of software tools and in a variety of modes and formats. The result has been considerable work on our part to integrate all figures, and in a few cases with resulting quality and uniformity verging on inadequate.

Nomenclature

In the preface to the Proceedings of the last conference in this series, one of us pointed out that one of the remaining things that restricts the exchange of information between the laboratories and institutes is the plethora of names given to different parts of the systems.

The first that comes to mind is the names for the computers at the second or third layers of the standard model. We now have even more, not fewer, this time:

- DIC, Device Interface Computer
- DSC, Device Stub Controller
- ECA, Equipment Control Assembly
- EIU, Equipment Interface Units
- FEC, Front End Computer (Controller)
- FFE, Far Front End
- IDC, Intelligent Device Controller
- ILC, Intelligent Local Controller (Computer),
- IOC, Input/Output Controller,
- LPC, Local Process Controller (Computer) and
- PCA, Process Control Assembly.

It would help if agreement could be obtained on a common name.

Acknowledgments

The smooth running of the conference depended on a number of people who devoted large amounts of time to ensuring its success. The names of the Local and International Committees can be found in the introductory pages. Also particularly noted are the efforts of Ms. Lisa Lopez who served as conference executive secretary and Ms. Donna Lamore who organized the construction and operation of the local computer center. We speak for all the organizers in expressing our hopes that all the conference participants enjoyed and profited from their visit to Chicago and that these Proceedings will be of value to them and to those who were unable to attend.

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