



**Fermi National Accelerator Laboratory**

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## **Producing and Supporting Sharable Software\***

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## Producing and Supporting Sharable Software

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What is the status of software engineering in the HEP community? Paolo Zanella, in his review of the trends in HEP in 1985 wrote "Even the most reluctant physicists are now convinced that computers are critical for the success of their experiments." He went on to say, regarding off-line computing: "...if forced to develop some long-lasting code, one should adopt some modern software engineering approach. About this issue it is often said that HEP has not kept in step with practices in the outside world, and has only recently become aware of the possibilities and of the problems associated with the production and maintenance of codes to be distributed to many users."<sup>1</sup> At this conference, Rudy Bock gave an excellent presentation on the extent of the software crisis in high energy physics in his talk "Software Issues for Large Detectors".<sup>2</sup>

Although in recent years there has been more emphasis on the importance of computing, as opposed to the detector hardware, to the success of an experiment, most of the emphasis continues to be on the computing hardware and the computing environment, rather than computing practices. If unbalanced, this emphasis could lead to creating bad code faster and faster, and, let's admit it, wrong answers. High energy physics experiments have always been underfunded and understaffed, and experiments are becoming more and more complex. Other complicating issues are the increasing complexity of the analysis codes coupled with the large numbers of people involved, their temporary commitments, their geographic distribution, and, in computing, their undereducation.

The high energy physics community has developed some tools over the last two decades to help overcome the shortcomings in FORTRAN, but the community has so far not accepted other programming languages like ADA or C, and little has been done to evaluate if existing solutions from outside the high energy physics community can be applied.

Given the decreasing price of hardware and the increasing power of local work stations, as well as the development of new concepts like parallel processors, one might ask the question whether the community is still dependent on, and at all interested in, an emphasis on sharable and/or transportable high energy physics software, or if special-purpose systems can provide a better, faster, and more appropriate solution for a given experiment.

It is important to evaluate if our community is making the best use of available resources, and how to plan most efficiently for future computer systems, hardware and software. In order to assess the perceived needs of the community, we distributed a questionnaire at the conference on the subject of sharable software.

We received 54 completed questionnaires out of an attendance of nearly 200. The questions and the compiled results in percentages are as follows:

<u>Yes</u>	<u>No</u>	<u>Other</u>	<u>Question</u>
98%	2%	0%	Is shareable software useful to the HEP community?
48%	30%	22%	Is it preferable to write HEP software in Fortran?
80%	11%	9%	Should we have rules on how to write Fortran programs?
93%	2%	5%	Do we need source management tools?
52%	46%	2%	Are you using any at the moment?
63%	18%	18%	Do we need a machine independent tool which would interface to both a local editor and a software management system?
93%	2%	5%	Do we want to coordinate our efforts in software in HEP? How?
93%	2%	5%	Should large facilities (CERN, SLAC, FERMILAB, ...) support the HEP community with software?
96%	0%	4%	Should these facilities distribute software?

The answers reflect a continued need for sharable software in the high energy physics community and that this effort be performed in coordination and not in isolation. There is a strong mandate for large facilities to support the high energy physics community with software and that these facilities should act as distribution points.

There appears to also be considerable interest in languages other than FORTRAN, and the desire was expressed for standards or rules in programming.

A strong need is perceived for source management tools, but only a bare majority are currently using any.

Since the need for sharable software and standards was expressed so strongly, it is interesting to note the comments regarding how this might be carried out. Comments ranged from generalities, like improved communication is needed, to the view that it is impossible to coordinate efforts in the high energy physics community. Other suggestions were that a small group of people get together to do the work, a network

conference be started, workshops, meetings, summer schools, and continuing workshop on SSC.

Joe Ballam wrote in "Future Plans for HEP Computing in the U.S." that the computer "should be considered as a full partner in the triumverate of accelerator, detector and computer." This would indicate that there should be parallels to the detector workshops, physics workshops, and annual Particle Accelerator Conference, on the subject of physics software.

A regularly-scheduled forum, held in the United States, on the subject of software issues in high energy physics, could serve to coordinate efforts, communicate accomplishments, as well as to educate the community. Such a forum, in our opinion, is long overdue.

References:

[1] Zanella, P., "Trends in Computing for HEP, Proceedings, Computing in High Energy Physics, Amsterdam, 1985.

[2] Bock, Rudy, "Software Issues for Large Detectors," this conference.

[3] Ballam, J., "Future Plans for HEP Computing in the U.S., Proceedings, Computing in High Energy Physics, Amsterdam, 1985.