# Esprit Workshop

# Esprit Projects on High-Performance Computing and Networking

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The Esprit Workshop at Euro-Par'97 is a new event in the series of the Euro-Par conferences. Our decision to invite the Esprit participants to present their research and development projects, carried out with the support of the European Commission, has been met with a good response. Each of the eleven submissions received was refereed by at least three experts, after which nine submissions were accepted for presentation at the conference.

The importance of high-performance computing and networking (HPCN) is recognized all over the world. In the European Union, it has lead to special HPCN programmes. The main objective of these programmes is to exploit the opportunities in the information technology to support the competitiveness of the European industries. The Esprit projects address the great expansion of application areas in which parallel and distributed computing become important or even necessary to solve complex and time-consuming problems. The current trend is that the growth of parallel computing power is realized not only by increasing the number of processors in a parallel computer, but also by combining the power of several geographically distributed computers by coupling them via communication networks.

Whereas the early European programmes put a strong emphasis on hardware and software technology, recent programmes are much more user-driven, with an emphasis on applications. Most projects are organized vertically, i.e., they involve vendors, implementors of software and application users, with users playing a key rather than a marginal rôle.

The Esprit workshop exhibits much more diversity in the topics than the traditional, more focussed workshops of the conference. Another distinguishing feature is a broad international cooperative effort behind each of the presented projects. The papers of the workshop report on using parallel and distributed systems in diverse areas of science and industry. The authors formulate also the challenges for the future and their vision of meeting these challenges.

To fit into the conference format, the workshop has been divided into two sessions: one session is on the projects that address practical problems of parallel and distributed computing and the other is on the HPCN application projects.

The first session starts with the presentation of projects PHASE and MICA devoted to metacomputing – the coordinated use of geographically distributed high-performance computers. The projects implement application-specific meta-computer environments: a pharmaceutical WWW-based application server and a model for CFD applications. The topic of the Internet is addressed also by the next presented project, FRONTIER. Its primary objective is to develop a par-allelizable hybrid technology for collaborative design optimization, which would enable the use of the Web technology in large joint projects. The PINEAPL project is a cooperative effort to produce a general-purpose library of parallel numerical software, suitable for a wide range of computationally intensive indus-trial applications. Coordinated by an industrial partner (NAG Ltd.), the project pays special attention to the reusability of the developed software and the tech-nology transfer. The next project, RAINS, aims at neural network applications for industry and medicine. The objective is to enable the use of comparatively in-expensive clusters of workstations instead of dedicated neurocomputers. Finally, the PARSAR project describes the porting of a data- and computation-intensive application – obtaining high-resolution images of the Earth's surface – to a clus-ter of UNIX workstations under PVM.

The second session starts with the OCEANS project, whose goal is to in-vestigate and develop state-of-the-art compilation techniques to allow high per-formance implementations of embedded applications. As a case study, compiler-performed optimizations on multimedia applications are considered. The next, SEEDS, develops a general-purpose toolkit for the simulation of distributed traf-fic control systems on a cluster of workstations. As a case study, the ground traffic control in airports is considered. The area of embedded systems with their high requirements on fault-tolerance is addressed by the EFTOS project. Through the development of a generic fault tolerance framework, the burden of ad hoc programming of corresponding mechanisms is removed from the application de-velopers. The final presentation of the session is on project STAMPAR, which demonstrates the use of explicit dynamic programming for the solution of indus-trial sheet stamping problems.

The projects presented at the Esprit workshop provide a snapshot of the current European R&D activities in the area of parallelism and, thereby, make a valuable contribution to the exchange of ideas and experience from academia and industry at Euro-Par'97.