

Workshop 01

Support Tools and Environments

Workshop 01 : Support Tools and Environments

Allen D. Malony and Bernard Tourancheau

Developing large applications on distributed and shared memory parallel machines is a difficult task, especially for newcomers who are accustomed to thinking sequentially about their computations and who have little knowledge of parallel programming techniques. However, parallelism is clearly gaining importance in a broad range of industrial and business sectors, and continues to be a dominant factor across scientific disciplines where high-performance computing and/or large data storage is required. The problems, then, are how to migrate many sequential codes to parallel platforms easily and efficiently, and how next-generation parallel systems can better be utilized in order to solve new larger-scale problems at higher speed, with greater storage capacity, and in a more heterogeneous computing environment.

During the last several years, tremendous efforts have been invested in the definition of support tools, libraries, and languages for parallel computing systems. In some cases, these efforts led to de facto standards defined and adopted by the community, like PVM (Parallel Virtual Machine), MPI (Message Passing Interface) and HPF (High Performance Fortran). Although these results help to focus application development activities on a few common programming foundations, they are only part of the solution. It is unlikely that we will ever see a “black box compiler” able to parallelize a non-trivial serial code into an efficient parallel code. Thus, there is a high need for tools supporting parallel programming, debugging, and performance tunings efforts. Recent efforts have tried to build environments that integrate these tools, but the difficulty of offering a completely portable toolset remains at large.

Research in the domain of “Support Tools and Environments” is a core area of high-performance parallel computing. The primary purpose of this workshop is to gather researchers who are creating the future trends of software technologies for this area. We characterize support tools and environments with respect to two main domains:

- software support tools that provide run-time services to the application (libraries, OS layers, monitoring probes, . . .), and
- software tools and environment that do not interfere during the run time of the application (visualization toolboxes, data and control flow based optimizer, parallelizers, . . .).

The first is necessary to not only be able to observe an application’s behavior during execution, but also provide more robust support to the application to extend its run-time functionality (e.g., to provide online visualization capabilities). The second domain of tools and environments can be thought of as embodying knowledge about parallelism that aids the users in the design and optimization of their parallel code.

We tried in this workshop to provide a meeting place for world-wide specialists in these two domains of parallel tools and environments to present their current research. However, it is also important for the workshop to hear from the parallel program developers and the parallel computing users about their needs and their expectations for parallel computing. We hope all the participants' discussions and the contacts that they make will contribute to the future trends of software support tools and environments for high-performance computing.