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Network-Based Parallel Computing

Communication, Architecture, and Applications

4th International Workshop, CANPC 2000
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Preface

Clusters of workstations/PCs connected by off-the-shelf networks have become popular as platforms for cost-effective parallel computing. Technological advances in both hardware and software have made such a network-based parallel computing platform an affordable alternative to commercial supercomputers for an increasing number of scientific applications.

Continuing in the tradition of the three previously successful workshops, this fourth Workshop on Communication, Architecture and Applications for Network-based Parallel Computing (CANPC 2000) brought together researchers and practitioners working in architecture, system software, applications, and performance evaluation to discuss state-of-the-art solutions for network-based parallel computing. This year, the workshop was held in conjunction with the sixth International Symposium on High-Performance Computer Architecture (HPCA-6).

As in prior editions, the papers presented here are representative of a spectrum of research efforts from groups in academia and industry to further improve cluster computing's viability, performance, cost-effectiveness, and usability. Specifically, we have arranged the contributions in this edition into four groups: (1) program development and execution support, (2) network router architecture, (3) system support for communication abstractions, and (4) network software and interface architecture.

The first group contains three papers that focus on programming and usability of clusters. Unlike tightly-coupled parallel supercomputers, clusters are built with commodity networking technology and operating systems. As such, clusters require additional support in the areas of program deployment and transparent and robust network connectivity. The specific contributions include a remote execution facility to deploy programs in a cluster in a transparent, secured, and decentralized manner; and a transparent mechanism to virtualize network connectivity in dynamic cluster environments. This group also includes a paper on a visual parallel programming tool for the BSP distributed programming model.

The second and third groups of papers improve on crucial aspects of the cluster technology such as routing (papers on Up*/Down* routing, dynamic routing reconfiguration, deadlock-free routing), and system support for derived data types and collective communication. These efforts show how the cluster concept is influencing research on topics that for years have been associated with traditional large-scale supercomputers, like interconnect topologies, routing schemes, parallel libraries.

The fourth group addresses the high software and network interface communication overheads characteristic of clusters. One paper goes back to the root of the network computing approach, and performs an in-depth analysis of existing gigabit architectures (VIA, Gigabit Ethernet). Another evaluates various design

points for the emerging industry standard for interface architectures, VIA. The third paper in this section proposes a novel messaging implementation in which the system learns and predicts patterns of message sequences to reduce the processing overhead.

Our excellent program this year was only made possible with the help and great efforts of many people. First, we would like to thank all of the authors for submitting papers, the program committee for their timely and meticulous reviewing and selection of the papers, and the HPCA-6 organizing committee for their support of this workshop. Special thanks to Henri Bal for giving an excellent keynote address. Finally, we would like to thank the editorial staff of Springer-Verlag for agreeing to publish the final version of these proceedings.

April 2000

Babak Falsafi and Mario Lauria
Program Co-chairs

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