Conference Report

The 2nd International Conference on Vector and Parallel Computing: Issues in Applied Research and Development

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1. Introduction

In the summer of 1986, an international conference on supercomputing was held at Loen, Norway [10,7]. On June 6–10, 1988, a successor conference took place at Tromsø and was named LoenII by the organizing committee. About 300 participants from 23 countries attended this conference, organized by IBM Bergen Scientific Centre, SIAM/SIAG on Supercomputing, and ACM SIGARCH. The programme consisted of 17 invited papers, 6 student scholarship papers, 4 panel sessions, over 140 contributed presentations, and 7 vendor demonstrations.

On registration, the participants received a binder of almost 200 pages containing the summaries of talks and affiliations of all contributors. The conference proceedings will be published by MIT Press in the *International Journal of Supercomputer Applications*. The invited papers, a number of selected contributed papers, and the 6 student scholarship papers will be included in the conference issue.

In the present report, we give a more global description of the conference indicating some new developments compared with the 1986 meeting. We hope to stimulate the reader's interest in the forthcoming proceedings.

2. The invited papers

The invited speakers had 45 minutes to present their talks. The topics covered are representative for the scope of the whole conference. For this reason, we give a list of speakers and their contributions including a few references:

Speaker	Title
Alan Weis	The Grand Challenges of Supercomputing
Al Erisman	Supercomputing as a Tool for Product Development [5]

Karl Solchenbach	On The Suprenum System [12]
Alec Grimison	IBM Supercomputing Trends and Directions
David Warren	Parallel Logic Programming [14]
Tony Chan	Domain Decomposition Algorithms and Applications to CFD [3]
Gérard Meurant	Domain Decomposition Methods for Parallel Computers
Wolfgang Gentzsch	Comparison of Super-& Mini-Supercomputers for CFD Calculations [6]
Cleve Moler	Images of Matrices
Alvy Ray Smith	Visualization in Art, Science & Technology
James Little	Parallel Integration of Vision Modules [9]
Linda Shapiro	Programming Parallel Vision Algorithms: A Dataflow Language Approach [11]
Johnny Petersen	Seismic Wave Propagation and Absorbing Boundary Conditions
Richard Ewing	Large Scale Computing in Reservoir Simulation
Ken Kennedy	PARASCOPE: A Parallel Programming Environment [2]
Antony Jameson	Current Directions & Future Possibilities in CFD
Jan Kok	Parallel Programming with Ada
John Hertz	Neural Computing [8]

In contrast to the first conference, vector computing no longer was a major topic. Most authors already assumed familiarity with vectorization techniques when using them in a broader context.

Some speakers pointed out that in a number of applications (like fluid dynamics, geophysics or CAD/CAM) printed output is no sufficient basis for deep insight. Sophisticated graphical tools are needed to facilitate the interpretation of numerical results. Thus, in the near future there will be a growing demand for a tight integration of computations and graphical pre- and postprocessing. Two of the invited talks were explicitly concerned with computer graphics.

3. Student scholarship papers

Six students, selected out of 29, were invited to present their papers in a special session of the main programme. The quality of their presentations was good and the subjects treated were diverse, as is illustrated by the following list:
- Christian Bischof (Cornell University):
  A Pipelined QR Factorization Algorithm with Adaptive Blocking;
- Johannes Engels (Universität Bonn):
  An OR-Parallel Execution Model for Full Prolog;
- Van Emden Henson (University of Colorado):
  Parallel Compact Symmetric FFTs;
- Martin Kiehl (TU München):
  Vectorizing the Multiple Shooting Method for the Solution of Boundary
  Value Problems and Optimal Control Problems;
- Maria E.G. Ong (University of Washington):
  The 3D Linear Hierarchical Basis Preconditioner;
- He Zhang (Temple University):
  A New Parallel Algorithm for LU Decomposition.

This initiative of enabling gifted students to participate actively in an international meeting by means of scholarships proved to be an enrichment of the conference and thus should become a permanent element.

4. Contributed papers

Each afternoon, two parallel thematic sessions were held, plus several poster presentations. A great variety of topics was dealt with in these contributions.

In the past few years, a number of new commercially available parallel computers were introduced (Alliant, Connection Machine, BBN Butterfly and Sequent to mention a few). Therefore, in contrast to the first Loen conference [13], many of the results presented referred to experiences with real machines and not merely to simulations. To some extent, parallel processing has now left its experimental phase, and parallel computers are used not only in order to implement (numerical) algorithms, but also for running application programs.

Many existing algorithms are not parallel by nature and current compilers are not yet able to parallelize a non-trivial program to a sufficient level. Hence, most of the contributions focussed on the design of parallel algorithms and on efficient implementations for the machine(s) at hand. Both aspects often require still a lot of research to be done.

Some of the contributed papers in the parallel sessions should have relied more on the introductory material presented in several of the invited survey talks. Authors should react more flexibly on the previous main lectures.

5. Panel sessions

Four panel sessions were organized. The topics were Advanced Computer Architectures, Computational Fluid Dynamics, Reservoir Modelling, and Neural Computing.

For example, the Advanced Computer Architectures session was chaired by I.S. Duff and J.J. Dongarra. After a short introduction given by the chairmen, the vendors were invited to present a brief description of their latest developments (8 min. each). All participants of this session could benefit from a lively discussion.

6. Vendor demonstrations

The Bergen Scientific Centre IBM had workstation demonstrations showing some of their results. Alliant, Convex, and ETA provided information and documentation on their products. For those participants who wanted to see the results with their own eyes, Intel and AMT had installed a real machine. At least one of the speakers took advantage of this and at the end of her talk she presented some figures obtained on the iPSC2, temporarily installed at the "Kulturhuset". The NAG library presented some of its reports and documentation. Elsevier exposed a selection of books on supercomputing.

Moreover, a non-official demonstration of some supercomputer software tools from Argonne National Laboratory deserves mentioning. For those interested J.J. Dongarra showed and explained the SCHEDULE package [11], which contains tools for the development of parallel programs, and the MAP package [1] for an analysis of leads and stores of array elements within an algorithm. Both programs include a graphical interface running on a Sun workstation.

7. The social programme

A conference should achieve two goals: to spread knowledge among the participants and to stimulate contacts between them. The official programme usually takes care of the first goal. The second one is more difficult to arrange for, but we think the organizers deserve a special

compliment on this. The 24 hours of daylight were fully utilized. Each evening, some event or excursion was organized for the whole conference group; thus, new contacts could be set up easily and the old ones could be refreshed.

8. Conclusions

This very stimulating Tromsø conference gave a good impression of the state of the art in supercomputing. It was a wise decision to limit the number of participants. This gave security that the programme was not overloaded, the latter leading to extremely short presentations and too many parallel sessions. The variety of topics presented made obvious that at the moment a lot of people are working very hard in many fields of supercomputing to overcome the actually dominating difficulties and to be prepared for new challenges.

Research efforts in the field of parallel processing will presumably continue for many years to come and a number of Loen conferences will be needed. LoenIII, scheduled for June 11–15, 1990, will reveal the results of the coming two years of supercomputer research.

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