THE ARCHITECTURE OF SCIENTIFIC SOFTWARE: THE CONFERENCE

In this chapter we provide some background information on the conference that brought together the researchers whose work is described in this volume.

1. CONFERENCE VENUE

The conference *Software Architectures for Scientific Computing Applications* was held in Ottawa, Ontario, Canada on October 2-4, 2000. This was the eight working conference of the International Federation for Information Processing (IFIP) Working Group on Numerical Software (WG2.5) on behalf of the IFIP Technical Committee on Software: Theory and Practice (TC 2). The conference was held on the campus of the National Research Council (NRC) of Canada in Ottawa, where it was hosted by the Institute for Information Technology. The 38 attendees of the focused workshop heard 20 invited presentations. Considerable time was allotted for discussion of issues raised during the talks, and the bulk of this discussion is recorded in this volume.

2. THE TECHNICAL PROGRAM

Monday, October 2, 2000

- 09:00 *Network-based Scientific Computing*. Elias Houstis (Purdue University)
- 09:45 *Broadway: Software Architecture for Scientific Computing*. Calvin Lin (University of Texas at Austin)
- 10:30 Break
- 11:00 *Data Management Systems for Scientific Applications*. Reagan Moore (San Diego Supercomputer Center)
- 11:45 *Developing Architecture to Support the Implementation and Development of Scientific Computing Applications*. Jack J. Dongarra (University of Tennessee)
- 12:30 Lunch

The original version of this chapter was revised: The copyright line was incorrect. This has been corrected. The Erratum to this chapter is available at DOI: [10.1007/978-0-387-35407-1_22](https://doi.org/10.1007/978-0-387-35407-1_22)

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- 14:00 *PETSc and Overture: Lessons Learned Developing an Interface Between Components.* Kristopher Buschelman (Argonne National Laboratory)
- 14:45 *On the Role of Mathematical Abstractions for Scientific Computing.* Krister Åhlander (University of Bergen)
- 15:30 Break
- 16:00 *The Virtual Testing Facility Application Framework.* J. T. C. Pool (California Institute of Technology)

Tuesday, October 3, 2000

- 09:00 *Formal Methods for High-Performance Linear Algebra Libraries.* Robert van de Geijn (University of Texas at Austin)
- 09:45 *Software Components for Application Development.* Anne Trefethen (NAG)
- 10:30 Break
- 11:00 *Component Technology for High-Performance Scientific Simulation Software.* Scott Kohn (Lawrence Livermore National Laboratory)
- 11:45 *A New Approach to Software Integration Frameworks for Multi-Physics Simulation Codes.* Milind Bhandarkar (University of Illinois)
- 12:30 Lunch
- 14:00 *Hierarchical Representation and Computation of Approximate Solutions in Scientific Simulations.* Wayne Enright (University of Toronto)
- 14:45 *Software Architecture for the Investigation of Controllable Models with COMplex Data Sets.* Dmitry V. Belyshev (Program Systems Institute, Russian Academy of Sciences)
- 15:30 Break
- 16:00 *Multi-Language Programming Methodology for High-Performance Java.* Vladimir Getov (University of Westminster and Los Alamos National Laboratory)

Wednesday, October 4, 2000

- 09:00 *A Comprehensive DFT API for Scientific Computing.* Ping Tak Peter Tang (Intel Corporation)
- 09:45 *New Generalized Data Structure for Matrices Leading to a Variety of High-Performance Algorithms.* Fred Gustavson (IBM)
- 10:30 Break

- 11:00 *A Collaborative Code Development Environment for Computational Electromagnetics.* David W. Walker (Oak Ridge National Laboratory)
- 11:45 *Code Coupling Using Parallel CORBA Objects.* Christophe René (IRISA/IFSIC)
- 12:30 Lunch
- 14:00 *Object-oriented Modeling of Parallel PDE Solvers.* Michael Thuné (Uppsala University)
- 14:45 *A Fortran Interface for POSIX Threads.* Richard Hanson (Rice University)

3. ORGANIZATION

The Program Committee consisted of Ronald Boisvert, Wayne Enright, Stuart Feldman, Brian Ford, Patrick Gaffney, Morven Gentleman (co-chair), Ian Gladwell, Eric Grosse, Pieter Hemker, Richard Kazman, Mo Mu, James C. T. Pool (co-chair), John Rice, Mary Shaw, Brian Smith, Peter Tang, and Mladen Vouk.

Morven Gentleman served as local arrangements chair. Roger Impey hosted the conference for the NRC, and Nicole Sarault and Guylaine Caron assisted.

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4. PARTICIPANTS

Krister Åhlander	University of Bergen, Norway
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Ronald F. Boisvert	National Inst. of Standards and Technology, USA
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Bruce Char	Drexel University, USA
Jack Dongarra	University of Tennessee, USA
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5. **IFIP WORKING GROUP 2.5**

In 1974 IFIP established the Working Group on Numerical Software under the auspices of its Technical Committee on Software: Theory and Practice. The group started with 13 members and has since grown to a membership of more than 30.

The aim of Working Group 2.5 is to improve the quality of numerical computation by promoting the development and availability of sound numerical software. Objectives within the scope of the Working Group 2.5 are as follows.

- The definition from a numerical standpoint of a set of hardware and software features for a computing system.
- The development and improvement of programming languages for numerical computation.

- The establishment of guidelines for comparison of subroutines from different numerical program libraries.
- The establishment of guidelines for documentation, testing, distribution and maintenance of numerical program libraries.
- The exchange of information concerning numerical software and determination of the needs of computer users.

The following mode of work has been established within WG 2.5.

1 Working group meetings

The group meets roughly once a year. (There have been 27 meetings so far). At these meetings, areas of activity and the proper means of achieving results are defined. Reports on current or completed activities are given and discussed.

2 Projects

Most activities take the form of projects. One or several members of the group assume the responsibility to pursue a given subject matter in collaboration with other scientists in the field. Results of projects are either published through standard channels or, in special cases, may take the form of an IFIP-document.

3 Working Conferences

This is a standard means of IFIP-activity: 30-70 experts are invited to meet to discuss and advance a narrow technical subject area. The proceedings of a working conference appear as a book.

For further information, see <http://www.nsc.liu.se/wg25.html> .