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Grid Computing – GRID 2000

First IEEE/ACM International Workshop
Bangalore, India, December 17, 2000
Proceedings



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Preface

Welcome to GRID 2000, the first annual IEEE/ACM international workshop on grid computing sponsored by the IEEE Computer Society's Task Force on Cluster Computing (TFCC) and the Association for Computing Machinery (ACM). The workshop has received generous sponsorship from the European Grid Forum (eGrid), the EuroTools SIG on Metacomputing, Microsoft Research (USA), Sun Microsystems (USA), and the Centre for Development of Advanced Computing (India).

It is a sign of the current high levels of interest and activity in Grid computing that we have had contributions to the workshop from researchers and developers in Australia, Austria, Canada, France, Germany, Greece, India, Italy, Japan, Korea, The Netherlands, Spain, Switzerland, UK, and USA. It is our pleasure and honor to present the first annual international Grid computing meeting program and the proceedings.

The Grid: A New Network Computing Infrastructure

The growing popularity of the Internet along with the availability of powerful computers and high-speed networks as low-cost commodity components are helping to change the way we do computing. These new technologies are enabling the coupling of a wide variety of geographically distributed resources, such as parallel supercomputers, storage systems, data sources, and special devices, that can then be used as a unified resource and thus form what is popularly known as the "Grids". The Grid is analogous to the power (electricity) grid and aims to couple distributed resources and offer consistent and inexpensive access to these resources irrespective of their physical location. The interest in creating Grids (by pooling resources from multiple organizations) is growing due to the potential for solving large-scale problems that typically cannot be solved with local resources. Internationally there are a large number of projects actively exploring the design and development of different Grid system components, services, and applications. Pointers to these projects can be found at the following sources:

- Grid Infoware – <http://www.gridcomputing.com>
- IEEE Distributed Systems Online – <http://computer.org/channels/ds/gc>

It is projected that Grids are expected to drive the economy of the 21st century in a similar fashion to how electrical power grids drove the economy of the 20th century.

Grid systems need to hide complexities associated with the management and usage of resources across multiple administrative institutions. The following are some of the key features of Grid infrastructures:

- Flexibility and extensibility
- Domain autonomy
- Scalability
- Global name space

- Ease of use and transparent access
- Performance
- Security
- Management and exploitation of heterogeneous resources
- Interoperability between systems
- Resource allocation and co-allocation
- Fault-tolerance
- Dynamic adaptability
- Quality of Service (QoS)
- Computational Economy

The grid must be designed and created in such a way that their components (fabric, middleware, and higher-level tools) and applications handle the key design issues in a coordinated manner. For instance, Grid middleware offers services for handling heterogeneity, security, information, allocation, and so on. Higher level tools, such as resource brokers, support dynamic adaptability through automatic resource discovery, trading for economy of resources, resource acquisition, scheduling, the staging of data and programs, initiating computations, and adapting to changes in the Grid status. In addition, they also need to make sure that domain autonomy is honored but still meets user requirements such as QoS in coordination with other components. The papers accepted for inclusion in these proceedings address various issues related to the design, development, and implementation of Grid technologies and their applications.

Program Organization and Acknowledgements

The response to the workshop's call for papers has been excellent and we expect that attendance at the actual workshop will be equally impressive. The GRID 2000 program consists of a keynote speech (by Wolfgang Gentzsch on "DOT-COMing the GRID: Using Grids for Business"), an invited talk, and refereed technical paper presentations. We have accepted papers from authors of fifteen countries from among submissions from eighteen countries. We would like to thank all authors for submitting their research papers for consideration. We have grouped the contributed papers into five distinct categories, although inevitably there is some overlap:

- Network enabled server systems for the Grid (invited paper)
- Grid resource management
- Grid middleware and problem solving environments
- Grid testbeds and resource discovery
- Application-level scheduling on the Grid

The GRID 2000 meeting would not have taken place without the efforts of Viktor Prasanna, who has been the main driving force behind the international conference on High Performance Computing (HiPC). It is our pleasure to acknowledge his efforts and thank him for encouraging us to organize this annual internal meeting on Grid computing. The success of the workshop is wholly due to the hard work of the program committee members and external reviewers. They have donated their

precious time for reviewing and offered their expert comments on the papers. All submitted papers have been peer reviewed by the technical program committee members and external referees. We requested four reviews for each paper and ensured that each paper received a minimum of three reviews. All highly recommended and promising works have been selected for presentation at the meeting.

We thank our keynote speaker Wolfgang Gentsch (Director of Network Computing, Sun Microsystems) and invited speaker Satoshi Matsuoka (Tokyo Institute of Technology, Japan) for presenting their vision on Grid technologies.

We owe a debt of gratitude to all our sponsors and contributors. In particular, we would like to thank R.K. Arora (C-DAC, Pune), Mohan Ram (C-DAC, Bangalore), and Wolfgang Gentsch (Sun Microsystems) for responding to our request for financial support enthusiastically and being instrumental in obtaining generous donations from their respective organizations. Our special thanks go to Todd Needham (Microsoft Research, USA), who has voluntarily come forward to support our Task Force activities. We would also like to thank Hilda Rivera (ACM) for handling our request for ACM “in-cooperation” status. We thank Jarek Nabrzyski for his help in gathering the European Grid forum support for this workshop. Finally, we would like to thank the Springer-Verlag team, particularly Jan van Leeuwen (LNCS series editor), Alfred Hofmann (Executive Editor), Antje Endemann, and Karin Henzold. They are wonderful to work with!

We hope these proceedings serve as a useful reference on Grid computing. We wish you all the best and hope you enjoy your visit to the Silicon Valley of India!

December 2000
GRID 2000 Co-chairs
<http://www.gridcomputing.org>



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- Peter Sloot, University of Amsterdam, The Netherlands

GRID 2000 Additional Referees

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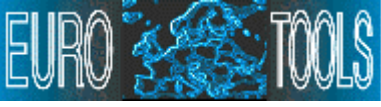




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