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1 Welcome to Euro-Par 2005

We are pleased to welcome you to the 11th International Euro-Par Conference. Euro-Par 2005 takes place in the campus of the Faculty of Science and Technology of Universidade Nova de Lisboa, and is organized locally by the CITI Research Centre and the Computer Science Department. We are honored to host this event. It is a fortunate coincidence that this year we are also celebrating the 30th anniversary of the Computer Science Department, and its pioneer role in the launching of the first Computer Science degree in Portugal, back in 1975.

The conference programme is full of exciting events. The conference programme includes four keynote speeches, three tutorials, 120 paper presentations, and several exhibits. We are honored to have four excellent keynote speakers, José Fortes, Omer Rana, Raymond Bair, and José Moreira, who have kindly accepted to share their deep insights, knowledge and experience with all of us. Euro-Par 2005 has attracted a record number of paper submissions, making the selection quite competitive, and allowing the acceptance of high-quality papers, representing a diversity of countries. One hundred and twenty papers are included in the programme, organized in five parallel tracks, addressing important themes across all the conference topics. Before the conference, there is a workshop on “Really large-scale grid architecture”, organized by the GridCoord EU initiative. During the conference, several working meetings take place, promoted by members of the GridCoord and the CoreGRID EU initiatives.

We hope Euro-Par 2005 also provides an opportunity to reveal aspects of the life and the history of Portugal and the region of Lisbon, and the typical Portuguese hospitality.

The organization of a conference of this size represents a huge and collective effort involving many people: The conference topic committees and the external reviewers; the financial supporters; the exhibitors; the members of the Euro-Par Steering Committee, and in particular, the Chair and the Vice-Chair; the Faculty of Science and Technology of Universidade Nova de Lisboa, in particular, the Rector of the University, and the Dean of the Faculty; the local organization committee; and the staff of the Computer Science Department and the CITI research centre who were involved in the organization. We also gratefully acknowledge the support from IBM Portugal and from the Portuguese Foundation for Science and Technology.

Welcome to Euro-Par 2005!

2 Euro-Par Conference Series

Euro-Par Mission Statement

Euro-Par is an annual series of international conferences dedicated to the promotion and advancement of all aspects of parallel computing (<http://www.europar.org>). The major themes can be divided into the broad categories of hardware, software, algorithms and applications for parallel computing. The objective of Euro-Par is to provide a forum within which to promote the development of parallel computing both as an industrial technique and an academic discipline, extending the frontier of both the state of the art and the state of the practice. This is particularly important at a time when parallel computing is undergoing strong and sustained development and experiencing real industrial take up. The main audience for and participants in Euro-Par are seen as researchers in academic departments, government laboratories and industrial organisations. Euro-Par's objective is to be the primary choice of such professionals for the presentation of new results in their specific areas. Euro-Par is also interested in applications which demonstrate the effectiveness of the main Euro-Par themes.

Sites of past conferences:

- Euro-Par'95: SICS and KTH, Stockholm, Sweden
- Euro-Par'96: École Normale Supérieure de Lyon, France
- Euro-Par'97: University of Passau, Germany
- Euro-Par'98: University of Southampton, UK
- Euro-Par'99: CERFACS / ENSEEIGHT-IRIT, Toulouse, France
- Euro-Par 2000: Technical University of Munich, Germany
- Euro-Par 2001: University of Manchester / Manchester Visualization Centre, UK
- Euro-Par 2002: University of Paderborn, Germany
- Euro-Par 2003: University of Klagenfurt, Austria
- Euro-Par 2004: University of Pisa, Italy

Sites of future conferences:

- Euro-Par 2006: Dresden University of Technology, Germany
- Euro-Par 2007: IRISA/ENS Cachan, Rennes, France

Euro-Par Steering Committee

The Euro-Par steering committee selects the future conference sites, oversees the planning of the yearly conferences and maintains the continuity of the series. The European members of the steering committee are elected (or re-elected) by the Euro-Par advisory board - usually for a three-year term. The non-European representatives in the steering committee are nominated by the steering committee. Honorary members are appointed for life by the steering committee. Organizers of future conferences who are not

elected members of the steering committee are appointed temporarily as observers. Here is the list of present members of the steering committee, and their appointment dates.

European representatives:

Christian Lengauer (Chair)	University of Passau, Germany - 1996, 1999, 2002
Luc Bougé (Vice-Chair)	ENS Cachan, France - 1995, 1998, 2001, 2004
José Cunha	New University of Lisbon, Portugal - 2004
Marco Danelutto	University of Pisa, Italy - 2000, 2001, 2004
Rainer Feldmann	University of Paderborn, Germany - 2002
Christos Kaklamanis	Computer Technology Institute, Greece - 2002
Paul Kelly	Imperial College, United Kingdom - 2000, 2003
Harald Kosch	University of Klagenfurt, Austria - 2003
Thomas Ludwig	University of Heidelberg, Germany - 2000, 2003
Emilio Luque	University Autònoma of Barcelona, Spain - 2002
Luc Moreau	University of Southampton, United Kingdom - 2000, 2003
Rizos Sakellariou	University of Manchester, United Kingdom - 2001, 2004

Non-European representatives:

Jack Dongarra	University of Tennessee at Knoxville, USA - 1999
Shinji Tomita	Kyoto University, Japan - 1999

Honorary members:

Ron Perrott	Queen's University Belfast, United Kingdom - 2000
Karl Dieter Reinartz	University of Erlangen-Nuremberg, Germany - 1998

Observers:

Wolfgang Nagel	Dresden University of Technology, Germany - 2004
Anne-Marie Kermarrec	IRISA, Rennes, France - 2004

3 Euro-Par 2005 Organization

- Host: CITI/Departamento de Informática
Faculdade de Ciências e Tecnologia
Universidade Nova de Lisboa
2825-516 Caparica, Portugal
Phone: (+351) 21 2948536
Fax: (+351) 21 2948541
- Conference Chair: José C. Cunha
- Conference Vice-chair: Pedro Medeiros
- Local Organizing Team: Jorge Custódio, Carmen Morgado, Vitor Duarte, João Lourenço, Paulo Lopes, Cecília Gomes, Rui Marques, Miguel Maurício, Filipa Reis, Anabela Duarte, and the Viagens Abreu team.
- Student volunteers: Carlos Gonçalves, Catarina Gomes, César Feliciano, Gil Sousa, Luis Assunção, Marcos Bento, Nuno Oliveira, Paulo Quaresma, Roberto Espenica, Sérgio Lopes, Vitor Carvalho, Samuel Rosa, João Luis, Ricardo Silva

Members of the local organization (including student volunteers) have a badge with a different color (ORANGE). Please look for one if you need help or advice.

Web site

<http://europar05.di.fct.unl.pt>

Conference Proceedings

- Proceedings:** José C. Cunha, Pedro Medeiros (Eds.)
Euro-Par 2005 - Parallel Processing
11th International Euro-Par Conference
Lisbon, Portugal, August 30 - September 2, 2005
Springer-Verlag, LNCS Vol. 3648, 2005,
ISBN 3-540-28700-0

4 Euro-Par 2005 Topics

Euro-Par 2005 was organized in sixteen topics, managed by the following topic committees.

Topic 01 - Support Tools and Environments

Global Chair: Henryk Krawczyk Technical University of Gdansk, Poland
Vice Chair: Jacques Chassin de Kergommeaux INPG-ENSIMAG, LSR-IMAG, Grenoble, France
Vice Chair: M. Pierre Manneback Faculté Polytechnique de Mons, Belgium
Local Chair: Tomàs Margalef Universidad Autònoma de Barcelona, Spain

Topic 02 - Performance Prediction and Evaluation

Global Chair: Allen D. Malony University of Oregon, USA
Vice Chair: Thomas Fahringer University of Innsbruck, Austria
Vice Chair: Allan Snavely San Diego Supercomputer Center
 University of California, San Diego, USA
Local Chair: Luís Silva University of Coimbra, Portugal

Topic 03 - Scheduling and Load Balancing

Global Chair: Denis Trystram ID-IMAG, Grenoble, France
Vice Chair: Uwe Schwiegelshohn University of Dortmund, Germany
Vice Chair: Michael A. Bender State Univ. of New York at Stony Brook, USA
Local Chair: Luís P. Santos University of Minho, Portugal

Topic 04 - Compilers for High Performance

Global Chair: Albert Cohen INRIA Futurs, Parc Club Orsay Université, France
Vice Chair: Martin Griebel University of Passau, Germany
Vice Chair: Michael O'Boyle University of Edinburgh, UK
Local Chair: José Moreira IBM Thomas J. Watson Research Center, USA

Topic 05 - Parallel and Distributed Databases, Data Mining and Knowledge Discovery

Global Chair: Domenico Talia University of Calabria, Italy
Vice Chair: Hillol Kargupta University of Maryland, Baltimore County, USA
Vice Chair: Patrick Valduriez INRIA and LINA, Nantes, France
Local Chair: Rui Camacho University of Porto, Portugal

Topic 06 - Grid and Cluster Computing: Models, Middleware and Architectures

Global Chair: Craig Lee The Aerospace Corp., El Segundo, CA, USA
Vice Chair: Thilo Kielmann Vrije Universiteit, The Netherlands
Vice Chair: Laurent Lefevre INRIA/LIP (UMR CNRS, ENS, INRIA, UCB), France
Local Chair: João Gabriel Silva University of Coimbra, Portugal

Topic 07 - Parallel Computer Architecture and ILP

Global Chair: Theo Ungerer University of Augsburg, Germany
Vice Chair: Kevin Skadron University of Virginia, Charlottesville, USA
Vice Chair: Josep-Lluís Larriba-Pey Polytechnic University of Catalonia, Spain
Local Chair: Pedro Trancoso University of Cyprus, Cyprus

Topic 08 - Distributed Systems and Algorithms

Global Chair: Marc Shapiro Microsoft Research Cambridge, UK
Vice Chair: Felix Gaertner RWTH University of Aachen, Germany
Vice Chair: Idit Keidar Technion - Israel Institute of Technology, Israel
Local Chair: Luís Rodrigues University of Lisbon, Portugal

Topic 09 - Parallel Programming: Models, Methods, and Languages

Global Chair: Marco Danelutto University of Pisa, Italy
Vice Chair: Denis Caromel Univ. of Nice, CNRS/I3S, INRIA, IUF, France
Vice Chair: Duane Szafron University of Alberta, Canada
Local Chair: Fernando Silva University of Porto, Portugal

Topic 10 - Parallel Numerical Algorithms

Global Chair: Jacek Kitowski AGH University of Science and Technology, Poland
Vice Chair: Boleslaw K. Szymanski Rensselaer Polytechnic Institute, Troy, NY, USA
Vice Chair: Andrzej M. Goscinski Deakin University, Victoria, Australia
Local Chair: Filomena d'Almeida University of Porto, Portugal

Topic 11 - Distributed and High-Performance Multimedia

Global Chair: Laszlo Boeszoermy University of Klagenfurt, Austria
Vice Chair: Max Muhlhauser Technical University of Darmstadt, Germany
Vice Chair: Geoff Coulson Lancaster University, UK
Local Chair: Nuno Correia Universidade Nova de Lisboa, Portugal

Topic 12 - Theory and Algorithms for Parallel Computation

Global Chair: Andrea Pietracaprina University of Padova, Italy
Vice Chair: Kieran Herley University College Cork, Ireland
Vice Chair: Christos Zaroliagis CTI & University of Patras, Greece
Local Chair: Casiano Rodriguez-Leon Universidad de La Laguna, Tenerife, Spain

Topic 13 - Routing and Communication in Interconnection Networks

Global Chair: Emilio Luque Universidad Autònoma de Barcelona, Spain
Vice Chair: Cruz Izu University of Adelaide, Australia
Vice Chair: Olav Lysne Simula Research Laboratory, Lysaker, Norway
Local Chair: José Legatheaux Martins Universidade Nova de Lisboa, Portugal

Topic 14 - Mobile and Ubiquitous Computing

Global Chair: Evaggelia Pitoura University of Ioannina, Greece
Vice Chair: Marios Dikaiakos University of Cyprus, Cyprus
Vice Chair: Valérie Issarny INRIA-Rocquencourt, France
Local Chair: Nuno Preguica Universidade Nova de Lisboa, Portugal

Topic 15 - Peer-to-Peer and Web Computing

Global Chair: Anne-Marie Kermarrec INRIA/IRISA, Rennes, France
Vice Chair: Antony Rowstron Microsoft Research Cambridge, UK
Vice Chair: Mark Jelasity University of Bologna, Italy
Local Chair: Henrique J. Domingos Universidade Nova de Lisboa, Portugal

Topic 16 - Applications of High-Performance and Grid Computing

Global Chair: Raymond Bair Argonne National Laboratory, USA
Vice Chair: Ed Seidel Max-Plank Institute fur Gravitationsphysik, Germany
 Louisiana State University, Baton Rouge, USA
Vice Chair: Michel Daydé IRIT-ENSEEIH, Toulouse, France
Local Chair: José Laginha Palma University of Porto, Portugal

5 Conference Site

Access to the Campus and Conference Buses

The Conference takes place at the Faculty of Science and Technology Campus in Monte de Caparica (<http://www.fct.unl.pt>) on the south bank of the Tagus River (Rio Tejo). The campus is well located, close to Lisbon (about 12 km from the city center) and near the seashore (about 4 km from the Atlantic Ocean). It is easily accessible from Lisbon by car, public bus or train, crossing the “Ponte 25 de Abril” (Abril 25th Bridge), or by ferryboats (maps can be found on the conference Web site).

Delegates who are staying in Lisbon must find their own way to the conference site (detailed information can be found on the conference Web site).

Most conference delegates will be staying at the *Hotel Costa da Caparica, Av. General Humberto Delgado, 47, 2829-506 CAPARICA, Phone: (+351) 212 918 900*. Each day, there are Conference Buses linking the hotel to the conference site in the morning and returning to the hotel in the evening. Please consult the information page on the bus schedule that is included in your conference bag.

The Students Residence is located at the Campus of Monte da Caparica. (Phone: (+351) 21 294 50 00)

Conference buses on Monday and Tuesday

On Monday and Tuesday, a bus will depart from the hotel to pick participants in the Workshop and in the Tutorials, and take them to the conference site, for the morning sessions. On Tuesday, another bus will depart from the hotel at 13:00, to pick participants in the afternoon Tutorial or in afternoon meetings. They will take participants back to the hotel, in the end of the afternoon sessions.

Conference buses from Wednesday to Friday

Each day, from Wednesday to Friday, there will be buses at the Hotel Costa da Caparica, starting at 8:30, to pick up conference participants. The buses will loop several times between the hotel and the conference site. Please make your plans in order to be near the hotel entrance gate by that time. If you miss the conference bus you must find your own way to the conference site. Delegates staying in other hotels at Costa da Caparica wishing to take the conference bus must find their own way to Hotel Costa da Caparica (they are located at walking distance from Hotel Costa da Caparica; please ask at your hotels).

Conference buses will take participants back to the hotel at the conclusion of the formal sessions on Thursday and Friday.

On Wednesday, at the conclusion of the formal sessions, at 18:30, the buses will depart from the conference site to the nearby town of Trafaria, for an excursion by boat along the Tagus river. At 18:00 a bus will also depart from Hotel Costa da Caparica, to take the accompanying persons who also want to go to the excursion. After the excursion is over, at about 21:00, the buses will take all participants, from the arrival pier at Trafaria, back to the Hotel Costa da Caparica and to the Students Residence.

On Thursday, the conference buses will transport participants to the banquet at Estufa Real in Lisbon. Buses will depart from the Hotel Costa da Caparica at 19:15. The conference banquet starts at 20:00. *It will be difficult to get to the banquet location if you miss these buses so, please, be on time!* At about

23:30, the buses will take banquet participants back to the Hotel Costa da Caparica and to the Students Residence.

Conference Building

All the Conference sessions are held in Building VII (E. VII in the map in annex). The rooms for each session are marked on the conference program and in placards at the entrance to the main hall of the building. Rooms 1A, 1B, and 1D are lecture halls located at the first floor (this is the ground level), and rooms 2A, and 2B are on the second floor (level 2) (please consult the map in annex). Other rooms on levels 2 and 3 have been allocated for working meetings during the conference days. The meetings schedule and locations are also marked in placards at the entrance to the main hall of the building.

Check-in, on-site registration and information requests will be handled, from Monday morning to Friday afternoon, at the Conference Desk, located at the entrance to the main hall of the building. Check-in will also be made during the Welcome Reception on Tuesday, 19:00, at Hotel Costa da Caparica. Exhibits will also take place in the conference building hall.

Computer Access

Four laboratories in the conference building, rooms 2.2 and 2.3 (at level 2), and rooms 3.2 and 3.3 (at level 3), marked by signs in the conference building, have been reserved for use by the conference delegates. In these laboratories there will be around 40 Windows XP machines. These machines will be equipped with standard software like Web browsers and SSH clients.

If you bring a wireless-enabled laptop it will be possible to access the Internet through the Campus wireless network. This network will be available everywhere in the conference building and in most parts of the campus. Please note that the campus wireless network is in early stage of deployment and the guarantees of privacy are weak. Your laptop should be running a personal firewall and an updated antivirus package.

To have access to the Campus wireless network just choose the “guest-e-U” SSID and everything should work well (don’t forget that the IP address must be obtained automatically through DHCP).

When connecting your laptop to a (wired) network socket, just configure the connection to obtain the IP address and other information through DHCP.

Please don’t forget that you are connecting your machine to a public network, sharing it with lots of students. . .

Coffee Breaks and Lunches, Monday to Friday

Coffee breaks will be served each day in middle of the morning, and in middle of afternoon, in the wing to the right of the conference building entrance hall.

Lunches will be served in the “Cantina” Building, just across the street and a few steps to the right from the main entrance of the conference building (see the map in the annex).

Please note that participants in the Workshop or in working meetings who have not registered to the Conference must get their tickets for having lunch at the Cantina, on Monday and Tuesday. Please contact the Conference Desk.

Other Useful Information

For emergencies during the conference, please contact the Conference Desk. The Secretariat of Departamento de Informática can also help, from 9:00 to 12:30 and from 14:00 to 17:00 each day. The secretariat can be reached at the number 212 948 536. (Please note that in all phone numbers, the Portugal country code is (+351))

Hopefully this will not be needed, but in case of an emergency, the closest hospital is the Hospital Garcia da Horta, just a few minutes drive from the Conference site. To call for an ambulance in an emergency situation, dial the number **112** (European Emergency Number) and provide your location.

You can call a Taxi from the Hotel Costa da Caparica, or ask at the Conference Desk.

Other useful phone numbers to call a Radio Taxi:

In Costa da Caparica/Almada: 212 947 070 / 212 509 660
In Lisbon: 218 111 100 / 218 119 000

Important Information for Session Chairs and Speakers

During the first coffee break of each day, Session Chairs and Speakers should meet at the "Meeting Point", in the hall of the conference building, close to the registration area:

- Speakers should bring their presentation slides in some computer readable medium (preferable a USB memory stick).
- During this briefing, Session Chairs and Speakers should go to the assigned session rooms. Speakers give the media with the presentation to the local staff member there. To minimize the switching time from one speaker to the next, the staff member will copy the presentation to the computer in the room and will test it.
- Session Chairs and Speakers of the afternoon sessions may complete this procedure during lunch time, or in the afternoon coffee break.
- Session Chairs and Speakers of the first morning sessions of Thursday and Friday should try to meet and install the presentations, on the day before, preferably at the afternoon coffee break, or in the end of the afternoon sessions.
- If this is not possible, they should attend the morning session rooms at least 15 minutes before the start.

Please consult also the information page in your conference bag.

6 Conference Programme

Overview Monday-Tuesday, August 29-30

GridCoord Workshop

There is one Workshop, taking place from Monday, August 29, to Tuesday morning, August 30. The workshop is organized by the **GridCoord** European initiative on grid computing (www.gridcoord.org). Euro-Par 2005 participants may freely attend the workshop.

10:00 – 18:00	Room: 1D	<i>Monday, August 29</i>
GridCoord Workshop	<i>Really Large-scale Grid Architecture</i>	
9:30 – 13:00	Room: 1D	<i>Tuesday, August 30</i>
GridCoord Workshop	<i>Really Large-scale Grid Architecture</i>	

Tutorials

On Tuesday, August 30, there are two full-day and one half-day tutorials.

9:30 – 17:30	Room: 1B	<i>Tutorial-1 (full-day)</i>
Eitan Farchi and Shmuel Ur	<i>Testing Multi-threaded and Distributed Applications</i>	
9:30 – 17:30	Room: 1A	<i>Tutorial-2 (full-day)</i>
Christine Morin and Renaud Lottiaux	<i>Kerrighed, a Single System Image Cluster Operating System</i>	
14:00 – 17:30	Room: 2A	<i>Tutorial-3 (half-day)</i>
Omer F. Rana	<i>Creating and Managing Distributed Scientific Workflows</i>	

Welcome Reception, Tuesday, August 30, 19:00

There is a Welcome Reception for all conference participants and their guests, starting at 19:00 on Tuesday, August 30, at the official conference hotel, Hotel Costa da Caparica. (Av. General Humberto Delgado, 47, 2829-506 CAPARICA, Phone: (+351) 212 918 900)

Overview Wednesday-Friday, August 31- September 2

Opening Session

Wednesday, 9:30, Room 1D

The *Opening Session* will include brief messages of welcome from the Rector of the University, Leopoldo Guimarães; the Vice-Dean of Faculty, Luís Monteiro; the Chairman of the Euro-Par Conference Series, Christian Lengauer; and the Euro-Par 2005 Conference Chair, José C. Cunha.

Keynote Speakers

Wednesday, 10:00 – 11:00	Room: 1D	Keynote Speaker
José Fortes	<i>On the Use of Virtualization and Service Technologies to Enable Grid Computing</i>	
Wednesday, 11:30 – 12:30	Room: 1D	Keynote Speaker
Omer Rana	<i>Agent based Computational Grids: Research Issues and Challenges</i>	
Friday, 14:45 – 15:45	Room: 1D	Keynote Speaker
Raymond Bair	<i>Science on a Large Scale</i>	
Friday, 16:15 – 17:15	Room: 1D	Keynote Speaker
José Moreira	<i>The Evolution of the Blue Gene/L Supercomputer</i>	

Paper Sessions

From Wednesday afternoon to Friday morning, there are forty sessions scheduled for presentation of the accepted papers. In the following sections, please consult the overview and the details of the sessions schedule.

Conference Banquet

The Conference Banquet takes place on Thursday, September 1, at Estufa Real, in the Botanic Garden in Lisbon. (*Restaurante Estufa Real, Jardim Botânico da Ajuda, Calçada do Galvão, Lisboa, Phone: (+351) 21 3619021/2*)

Accompanying persons may additionally take part in the two social events (reception and banquet), by buying extra tickets at the Conference Desk. Those who have ordered extra tickets should be certain that their guests present them at the banquet site.

Excursion on the Tagus River

A tour by boat along the Tagus River takes place on Wednesday, August 31, from 19:00 to 21:00, at no extra cost for the conference participants. For accompanying persons, individual tickets can be bought at the Conference Desk.

Closing Session

On Friday, the official closing session will take place at about 17:15.

Overview Wednesday-Friday

	Wednesday					Thursday					Friday					
9:00																9:00
9:15						Topic 1	Topic10	Topic 6	Topic 7	Topic 3	Topic 2	Topic16	Topic 9	Topic11	Topic15	9:15
9:30						Session	Session	Session	Session	Session	Session	Session	Session	Session	Session	9:30
9:45	Opening Session					2	1	2	2	2	4	2	4	1	1	9:45
10:00						Room 1D	Room 1A	Room 2A	Room 1B	Room 2B	Room 1D	Room 1A	Room 2A	Room 1B	Room 2B	10:00
10:15	Keynote Speaker: José Fortes					Coffee Break					Coffee Break					10:15
10:30																10:30
10:45	Coffee Break															10:45
11:00						Joint	Topic10	Topic 6	Topic 7	Topic 3	Topic 8	Topic16	Topic13	Topic11	Topic15	11:00
11:15						Topics	Session	Session	Session	Session	Session	Session	Session	Session	Session	11:15
11:30						1	2	3	3	3	3	3	3	2	2	11:30
11:45	Keynote Speaker: Omer Rana					and	2	3	3	3	3	3	2	2	11:45	
12:00						Room 1D	Room 1A	Room 2A	Room 1B	Room 2B	Room 1D	Room 1A	Room 2A	Room 1B	Room 2B	12:00
12:15						Lunch					Lunch					12:15
12:30																12:30
12:45																12:45
13:00	Lunch															13:00
13:15																13:15
13:30																13:30
13:45																13:45
14:00																14:00
14:15	Joint	Topic 1	Joint	Topic14	Topic 5	Topic 2	Topic10	Topic 9	Topic13	Topic 3	Europar 2006					14:15
14:30	Topics	Session	Topics	Session	Session	Session	Session	Session	Session	Session						14:30
14:45	12	1	4	1	1	2	3	2	2	4	Keynote Speaker: Raymond Bair					14:45
15:00	and	13	and	9	1	Room 1D	Room 1A	Room 2A	Room 1B	Room 2B						15:00
15:15	13	1	9	1	1	Room 1A	Room 1D	Room 2A	Room 1B	Room 2B						15:15
15:30	Room 1A	Room 1D	Room 2A	Room 1B	Room 2B											15:30
15:45	Coffee Break					Coffee Break					Coffee Break					15:45
16:00																16:00
16:15						Topic 2	Topic16	Topic 9	Topic14	Topic 8	Keynote Speaker: José Moreira					16:15
16:30						Session	Session	Session	Session	Session						16:30
16:45	Topic12	Topic 3	Topic 6	Topic 7	Joint	3	1	3	3	2						16:45
17:00	Session	Session	Session	Session	Topics	Room 1D	Room 1A	Room 2A	Room 1B	Room 2B						17:00
17:15	2	1	1	1	8						Closing Session					17:15
17:30	2	1	1	1	and											17:30
17:45	Room 1A	Room 2B	Room 2A	Room 1B	14											17:45
18:00																18:00
18:15																18:15
18:30																18:30
18:45																18:45
19:00	Excursion					Conference Banquet										19:00
19:15																19:15
19:30																19:30
19:45																19:45
20:00																20:00
20:15																20:15
20:30																20:30
20:45																20:45
21:00																21:00

Euro-Par 2005 Paper Sessions Organized by Topic

Topic 01 - Support Tools and Environments

Session 01-1:	<i>Wednesday, 14:15-15:45, Room 1D</i>
Session 01-2:	<i>Thursday, 9:00-10:30, Room 1D</i>
Joint Session Topics 01/02:	<i>Thursday, 11:00-12:30, Room 1D</i>

Topic 02 - Performance Prediction and Evaluation

Joint Session Topics 01/02:	<i>Thursday, 11:00-12:30, Room 1D</i>
Session 02-2:	<i>Thursday, 14:15-15:45, Room 1D</i>
Session 02-3:	<i>Thursday, 16:15-17:45, Room 1D</i>
Session 02-4:	<i>Friday, 9:00-10:30, Room 1D</i>

Topic 03 - Scheduling and Load Balancing

Session 03-1:	<i>Wednesday 16:15 - Room 2B</i>
Session 03-2:	<i>Thursday 9:00 - Room 2B</i>
Session 03-3:	<i>Thursday 11:00 - Room 2B</i>
Session 03-4:	<i>Thursday 14:15 - Room 2B</i>

Topic 04 - Compilers for High Performance

Joint Session Topics 04/09:	<i>Wednesday 14:15 - Room 2A</i>
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Topic 05 - Parallel and Distributed Databases, Data Mining and Knowledge Discovery

Session 05-1:	<i>Wednesday 14:15 - Room 2B</i>
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Topic 06 - Grid and Cluster Computing: Models, Middleware and Architectures

Session 06-1:	<i>Wednesday 16:15 - Room 2A</i>
Session 06-2:	<i>Thursday 9:00 - Room 2A</i>
Session 06-3:	<i>Thursday 11:00 - Room 2A</i>

Topic 07 - Parallel Computer Architecture and ILP

Session 07-1:	<i>Wednesday 16:15 - Room 1B</i>
Session 07-2:	<i>Thursday 9:00 - Room 1B</i>
Session 07-3:	<i>Thursday 11:00 - Room 1B</i>

Topic 08 - Distributed Systems and Algorithms

Joint Session Topics 08/14:	<i>Wednesday 16:15 - Room 1D</i>
Session 08-2:	<i>Thursday, 16:15 - Room 2B</i>
Session 08-3:	<i>Friday 11:00 - Room 1D</i>

Topic 09 - Parallel Programming: Models, Methods, and Languages

Joint Session Topics 04/09:	<i>Wednesday 14:15 - Room 2A</i>
Session 09-2:	<i>Thursday, 14:15 - Room 2A</i>
Session 09-3:	<i>Thursday 16:15 - Room 2A</i>
Session 09-4:	<i>Friday 9:00 - Room 2A</i>

Topic 10 - Parallel Numerical Algorithms

Session 10-1:	<i>Thursday 9:00 - Room 1A</i>
Session 10-2:	<i>Thursday 11:00 - Room 1A</i>
Session 10-3:	<i>Thursday 14:15 - Room 1A</i>

Topic 11 - Distributed and High-Performance Multimedia

Session 11-1:	<i>Friday 9:00 - Room 1B</i>
Session 11-2:	<i>Friday 11:00 - Room 1B</i>

Topic 12 - Theory and Algorithms for Parallel Computation

Joint Session Topics 12/13:	<i>Wednesday 14:15 - Room 1A</i>
Session 12-2:	<i>Wednesday, 16:15 - Room 1A</i>

Topic 13 - Routing and Communication in Interconnection Networks

Joint Session Topics 12/13:	<i>Wednesday 14:15 - Room 1A</i>
Session 13-2:	<i>Thursday, 14:15 - Room 1B</i>
Session 13-3:	<i>Friday 11:00: - Room 2A</i>

Topic 14 - Mobile and Ubiquitous Computing

Session 14-1:	<i>Wednesday, 14:15 - Room 1B</i>
Joint Session Topics 08/14:	<i>Wednesday 16:15 - Room 1D</i>
Session 14-3:	<i>Thursday 16:15 - Room 1B</i>

Topic 15 - Peer-to-Peer and Web Computing

Session 15-1: *Friday 9:00 - Room 2B*

Session 15-2: *Friday 11:00 - Room 2B*

Topic 16 - Applications of High-Performance and Grid Computing

Session 16-1: *Thursday 16:15 - Room 1A*

Session 16-2: *Friday 9:00 - Room 1A*

Session 16-3: *Friday 11:00 - Room 1A*

Detailed Programme

Tutorials

Tuesday, 9:30 – 17:30

Room: 1B

Tutorial-1 (full-day)

Eitan Farchi and Shmuel Ur
(IBM)

Testing Multi-threaded and Distributed Applications

Abstract

The industry's newest proven techniques and tools for reviewing and testing multithreaded applications will be presented in this tutorial, along with hands-on experience in their use. We will begin with an overview of why multithreaded code is so difficult to develop, and present, in some detail, the bug patterns commonly found in such code. We will then introduce the interleaving review technique (IRT), a very effective, scenario-based review technique for exposing scheduling problems. A review exercise in which participants will use concurrent bug patterns to find deadlocks and race conditions will conclude the first part of the tutorial.

The second part of the tutorial will discuss effective unit testing of multithreaded programs that expose concurrent bugs such as deadlocks, and race conditions. This is of utmost importance: bugs in multithreaded code are usually found during system or stress testing, or at the customer site, often with catastrophic consequences. We will further explain how function and system testing of multithreaded programs can be improved. An exercise in test execution techniques and analysis will conclude the tutorial. In the course of the session, we will also touch on aspects of debugging and coverage that are unique to multithreaded and distributed applications.

The techniques taught in the tutorial are being applied in the industry to multithreading distributive and concurrent code. They are used on all forms of software from embedded micro code all the way to huge middleware applications.

Tutorials

Tuesday, 9:30 – 17:30

Room: 1A

Tutorial-2 (full-day)

Christine Morin and Renaud
Lottiaux
(IRISA/INRIA)

*Kerrighed, a Single System Image
Cluster Operating System*

Abstract

Single System Image (SSI) systems for clusters have recently gained a lot of interest, in particular in the area of high performance computing. A single system image system provides the illusion that a cluster is a single machine. Such a system eases cluster use and programming for parallel computing. A SSI globally manages all the cluster resources to hide resource distribution in the cluster nodes. It is made up of a set of distributed services to manage processes, memory, data streams and files cluster-wide.

The goal of this tutorial is to provide a detailed understanding of the SSI technology available today. Kerrighed system, one of the leading SSI technology for clusters, will be presented. Kerrighed is a distributed operating system based on Linux giving the illusion of a virtual SMP machine. Results from a qualitative and quantitative comparative study with openMosix and OpenSSI, two other Linux based SSI systems, will be analyzed. Future research directions in the design of SSI systems will be discussed.

Tutorials

Tuesday, 14:000 – 17:30

Room: 2A

Tutorial-3 (half-day)

Omer F. Rana
(Cardiff University)

*Creating and Managing Distributed
Scientific Workflows*

Abstract

Viewing an application as a coordinated execution of one or more services has become an important undertaking recently. A variety of approaches have been introduced which enable distributed services to be combined across different administrative domains. Each service in this context may be independently managed, and may be made available at different time instances. Workflow is a concept commonly used to coordinate the execution of such services – and adapted from its use in automating business and information processes within an organisation. The notion of workflow has existed for many years, and workflow enactment generally refers to the automated execution of some activities in a pre-defined order.

The need to separate the “what” – which specifies the “knowledge to be used in solving problems”, from the “how” – the “problem solving strategies (process) by which that knowledge is used”, is an important step to enable the re-use of services within a workflow. This division between the control and logic is useful to enable components developed by a variety of vendors to interoperate more efficiently. Treating workflow as the “how” gives us a good handle on why the problem solving strategies may be usefully shared between different scientific communities. Additionally, workflow allows application developers to use problem solving features that would otherwise be too expensive to handcraft. For instance, the ability to directly manage the execution ordering of a set of services at runtime allows one to support advanced features like computational steering. Recent advances in Grid computing, for instance, often aim to provide suitable infrastructure to enable such services to be deployed and used by a variety of workflow enactment engines.

The aim of this tutorial is to introduce the general notion of distributed workflows, and then demonstrate techniques that may be used to support such workflows. A tool that may be used to enact distributed workflows will also be introduced. A significant portion of this tutorial will assume that a user has access to a graphical interface to compose the workflow. Techniques which are not based on such an interface, but rely on the use of planning techniques, will also be briefly introduced.

Detailed Programme: Wednesday, August 31

Wednesday, August 31, 9:30 – 10:00 Room: 1D

Opening Session

10:00 – 11:00

Room: 1D

Keynote Speaker

José Fortes
(University of Florida)

On the Use of Virtualization and Service Technologies to Enable Grid Computing

Abstract. The In-VIGO approach to Grid-computing relies on the dynamic establishment of virtual grids on which application services are instantiated. In-VIGO was conceived to enable computational science to take place In Virtual Information Grid Organizations. Having its first version deployed on July of 2003, In-VIGO middleware is currently used by scientists from various disciplines, a noteworthy example being the community of researchers of computational nanoelectronics (<http://www.nanohub.org>). All components of an In-VIGO-generated virtual grid - machines, networks, applications and data - are themselves virtual and services are provided for their dynamic creation. I will review the In-VIGO approach to Grid-computing and describe the associated middleware techniques and architectures for virtualizing Grid components, using services for creation of virtual grids and automatically Grid-enabling unmodified applications.

Brief Curriculum Vitae. José A.B. Fortes received the B.S. degree in Electrical Engineering (Licenciatura em Engenharia Electrotécnica) from the Universidade de Angola in 1978, the M.S. degree in Electrical Engineering from the Colorado State University, Fort Collins in 1981 and the Ph.D. degree in Electrical Engineering from the University of Southern California, Los Angeles in 1984. From 1984 until 2001 he was on the faculty of the School of Electrical Engineering of Purdue University at West Lafayette, Indiana. In 2001 he joined both the Department of Electrical and Computer Engineering and the Department of Computer and Information Science and Engineering of the University of Florida as Professor and BellSouth Eminent Scholar. From July 1989 through July 1990 he served at the US National Science Foundation as director of the Microelectronics Systems Architecture program. From June 1993 till January 1994 he was a Visiting Professor at the Computer Architecture Department of the Universitat Politecnica de Catalunya in Barcelona, Spain. His research interests are in the areas of distributed computing and information processing, computer architecture, and nanocomputing. He has authored or coauthored over 100 technical papers. His research has been funded by the Office of Naval Research, AT&T Foundation, IBM, General Electric and the National Science Foundation.

José Fortes is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) professional society. He was a Distinguished Visitor of the IEEE Computer Society from 1991 till 1995. José Fortes

is on the Editorial Boards of IEEE Transactions on Parallel and Distributed Systems, Cluster Computing: The Journal of Networks, Software Tools and Applications, the International Journal on Parallel Programming, ACM Journal on Emerging Technologies in Computer Systems and the Journal of VLSI Signal Processing. He is also a past member of the Editorial Board of the Journal of Parallel and Distributed Computing.

Omer Rana
(Cardiff University)

Agent based Computational Grids: Research Issues and Challenges

Abstract. As computer and computational scientists have to manage access to increasingly complex computing and data resources, this becomes a time consuming task. This is especially true for Computational Grids, which can involve the integration of resources distributed across multiple administrative domains. Deciding which systems to use, where the data resides for a particular application domain, how to migrate the data to the point of computation (or vice versa), and data rates required to maintain a particular application “behaviour” become significant. To support these, it is important to develop brokering approaches based on intelligent techniques – to support service discovery, manage performance based on data from monitoring tools, and support data selection. Although the use of broker-based techniques can be found in literature today – very few of these fully utilise the potential of an agent-based system. Intelligent agents provide a useful means to achieve the objectives outlined above. An important and emerging area within Grid computing is the role of service ontologies – especially domain specific ontologies, which may be used to capture particular application needs. Using these, scientists may be able to share and disseminate their data and software more effectively. This has been recognised as being important by both the computer and computational science community – and current efforts towards establishing “Semantic Grids” is a useful first step in this direction. The role of agent standards and how they can be integrated with Grid computing is explored. Specialist activities that can be undertaken by agent-based computing are outlined, along with example implementation of such systems. Research challenges that still need to be addressed are highlighted, along with possible benefits that overcoming such challenges will bring.

Brief Curriculum Vitae. Omer F. Rana is a Senior Lecturer in the Department of Computer Science at Cardiff University, and the Deputy Director of the Welsh eScience Centre. He also acts as a technical advisor to “Grid Technology Partners” (www.gridpartners.com) – a US based company specialising in Grid technology transfer to industry. He holds a PhD in Computing from Imperial College, London, and works in the areas of high performance distributed computing, multi-agent systems and data mining. Dr Rana has been involved in the programme committees for various conferences and workshops in the area of Grid Computing, and also participates on the Editorial boards of the “Concurrency and Computation: Practice and Experience”, “Scientific Programming”, and the “ACM Transactions on Autonomous and Adaptive Systems” journals.

Paper Sessions

Wednesday Afternoon, 31 August

Wednesday, 14:15 – 15:45 Room: 1A *Joint Session: Topics 12/13*
Theory and Algorithms for Parallel Comp. & Routing and Communication in Interc. Networks

Session Chair: *Christos Kaklamanis*, Computer Technology Institute, Greece

- [14:15 – 14:45] Efficient Bufferless Routing on Leveled Networks (*topic 12*) *Costas Busch, Shailesh Kelkar, Malik Magdon-Ismail*
- [14:45 – 15:15] Transport Time Distribution for Deflection Routing on an Odd Torus (*topic 13*) *J.M. Fourneau, T. Czarchóski*
- [15:15 – 15:45] Routing and Scheduling for a Novel Optical Multistage Interconnection Network (*topic 13*) *Siu-Cheung Chau, Tiehong Xiao, Ada Wai-Chee Fu*
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Wednesday, 14:15 – 15:45 Room: 1D *Session 01-1*
Support Tools and Environments 1

Session Chair: *Henryk Krawczyk*, Technical University of Gdansk, Poland

- [14:15 – 14:45] Tolerating Message Latency through the Early Release of Blocked Receives *Jian Ke, Martin Burtscher, Evan Speight*
- [14:45 – 15:15] Fast Convex Closure for Efficient Predicate Detection *Paul A.S. Ward, Dwight S. Bedassé*
- [15:15 – 15:45] A Generic Language for Dynamic Adaptation *Assia Hachichi, Gaël Thomas, Cyril Martin, Bertil Folliot, Simon Patarin*
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Wednesday, 14:15 – 15:45 Room: 2A *Joint Session: Topics 04/09*
Compilers for High Performance & Parallel Programming

Session Chair: *Albert Cohen*, INRIA, France

- [14:15 – 14:45] The Periodic-Linear Model of Program Behavior Capture (*topic 04*) *Philippe Clauss, Bénédicte Kenmei, Jean Christophe Beyler*
- [14:45 – 15:15] Deciding Where to Call Performance Libraries(*topic 04*) *Christophe Alias, Denis Barthou*
- [15:15 – 15:45] A Paradigm for Parallel Matrix Algorithms (*topic 09*) *David S. Wise, Craig L. Citro, Joshua J. Hursey, Fang Liu, Michael A. Rainey*
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Wednesday, 14:15 – 15:45	Room: 1B	<i>Session 14-1</i>
Mobile and Ubiquitous Computing 1		

Session Chair: *Henrique João Domingos*, Universidade Nova de Lisboa, Portugal

[14:15 – 14:45] Efficient and Fault-Tolerant Update Commitment Protocol for Weakly Connected Replication	<i>João Barreto, Paulo Ferreira</i>
[14:45 – 15:15] Controlling Concurrency in Mobile Computing Environments with Broadcast-based Data Dissemination	<i>José Maria Monteiro, Angelo Brayner</i>
[15:15 – 15:45] Integrating Mobile Devices into the Grid: Design Considerations and Evaluation	<i>Stavros Isaiadis, Vladimir Getov</i>

Wednesday, 14:15 – 15:45	Room: 2B	<i>Session 05-1</i>
Parallel and Distributed Databases, Data Mining and Knowledge Discovery		

Session Chair: *Domenico Talia*, University of Calabria, Italy

[14:15 – 14:45] MADIS: A slim middleware for database replication	<i>Luis Irún-Briz, Hendrik Decker, Rubén de Juan-Marín, Francesc Castro-Company, Jose E. Armendáriz-Iñigo, Francesc D. Muñoz-Escóí</i>
[14:45 – 15:15] Hierarchical Aggregation in Networked Data Management	<i>Pedro Furtado</i>
[15:15 – 15:45] Mining Global Association Rules on an Oracle Grid by Scanning Once Distributed Databases	<i>Frank Wang, Na Helian</i>

[Coffee Break: 15:45 – 16:15]

Wednesday, 16:15 – 17:45	Room: 1A	<i>Session 12-2</i>
Theory and Algorithms for Parallel Computation 2		

Session Chair: *Andrea Pietracaprina*, University of Padova, Italy

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| [16:15 – 16:45] Efficient Truthful Mechanisms for the Single-Source Shortest Paths Tree Problem | <i>Luciano Gualà, Guido Proietti</i> |
| [16:45 – 17:15] Optimal Embedding of the Hypercube on Partitioned Optical Passive Stars Networks | <i>Christos Kaklamanis, Charalampos Konstantopoulos</i> |
| [17:15 – 17:45] Dynamic Page Migration under Brownian Motion | <i>Marcin Bienkowski, Mirosław Korzeniowski</i> |
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Wednesday, 16:15 – 17:45	Room: 2B	<i>Session 03-1</i>
Scheduling and Load Balancing 1		

Session Chair: *Denis Trystram*, ID-IMAG, France

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| [16:15 – 16:45] Balancing Parallel Adaptive FEM Computations by Solving Systems of Linear Equations | <i>Henning Meyerhenke, Stefan Schamberger</i> |
| [16:45 – 17:15] CISNE: A New Integral Approach for Scheduling Parallel Applications on Non-Dedicated Clusters | <i>Mauricio Hanzich, Francesc Giné, Porfidio Hernández, Francesc Solsona, Emilio Luque</i> |
| [17:15 – 17:45] On optimum multiinstallment divisible load processing in heterogeneous distributed systems | <i>M. Drozdowski, M. Lawenda</i> |
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Wednesday, 16:15 – 18:15	Room: 2A	<i>Session 06-1</i>
Grid and Cluster Computing 1		

Session Chair: *Thilo Kielmann*, Vrije Universiteit, The Netherlands

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| [16:15 – 16:45] Combining Data Replication Algorithms and Job Scheduling Heuristics in the Data Grid | <i>Ming Tang, Bu-Sung Lee, Xueyan Tang, Chai-Kiat Yeo</i> |
| [16:45 – 17:15] Towards High-Level Grid Programming and Load-Balancing: A Barnes-Hut Case Study | <i>Martin Alt, Jens Muller, Sergei Gorlatch</i> |
| [17:15 – 17:45] An Adaptive Skeletal Processor Farm for Grids | <i>Horacio González-Vélez</i> |
| [17:45 – 18:15] Developing Java Grid Applications with Ibis | <i>Kees van Reeuwijk, Rob van Nieuwpoort, Henri Bal</i> |

Wednesday, 16:15 – 18:15

Room: 1B

Session 07-1

Parallel Computer Architecture and ILP 1

Session Chair: *Wolfgang Nagel*, Dresden University of Technology, Germany

[16:15 – 16:45] The Combined Perceptron Branch Predictor

Matteo Monchiero, Gianluca Palermo

[16:45 – 17:15] Target Encoding for Efficient Indirect Jump Prediction

Juan Carlos Moure, Domingo Benítez, Dolores Isabel Rexachs, Emilio Luque

[17:15 – 17:45] Dynamic Partition of Memory Reference Instructions - A Register Guided Approach

Yixin Shi, Gyungho Lee

[17:45 – 18:15] Value Compression for Efficient Computation

Ramon Canal, Antonio González, James E. Smith

Wednesday, 16:15 – 18:15

Room: 1D

Joint Session: Topics 8/14

Distributed Systems and Algorithms & Mobile and Ubiquitous Computing

Session Chair: *Marc Shapiro*, Microsoft Research Cambridge, UK

[16:15 – 16:45] A Dynamic Distributed Algorithm for Multicast Path Setup (*topic 08*)

Luca Gatani, Giuseppe Lo Re, Salvatore Gaglio

[16:45 – 17:15] Distributed Maintenance of a Spanning Tree using Labeled Tree Encoding (*topic 08*)

Vijay K. Garg, Anurag Agarwal

[17:15 – 17:45] New Bounds on the Competitiveness of Randomized Online Call Control in Cellular Networks (*topic 14*)

Ioannis Caragiannis, Christos Kaklamannis, Evi Papaioannou

[17:45 – 18:15] A Multiple Channel Access Protocol for Ad Hoc Wireless Networks (*topic 14*)

Kil-Woong Jang

18:30 – Buses depart for the Excursion

Thursday Morning, September 1

Thursday, 9:00 – 10:30	Room: 1D	<i>Session 01-2</i>
Support Tools and Environments 2		

Session Chair: *Tomàs Margalef*, Universidad Autònoma de Barcelona, Spain

[9:00 – 9:30] Soft Computing Approach to Performance Analysis of Parallel and Distributed Programs	<i>Hong-Linh Truong, Thomas Fahringer</i>
[9:30 – 10:00] The Data Diffusion Space for Parallel Computing in Clusters	<i>Jorge Buenabad-Chávez, Santiago Domínguez-Domínguez</i>
[10:00 – 10:30] Models for On-the-Fly Compensation of Measurement Overhead in Parallel Performance Profiling	<i>Allen D. Malony, Sameer S. Shende</i>

Thursday, 9:00 – 10:30	Room: 1A	<i>Session 10-1</i>
Parallel Numeric Algorithms 1		

Session Chair: *Filomena d'Almeida*, Universidade do Porto, Portugal

[9:00 – 9:30] Performance Measurements of the 3D FFT on the Blue Gene/L Supercomputer	<i>Maria Eleftheriou, Blake G. Fitch, Aleksandr Rayshubski, T.J. Chris Ward, Robert S. Germain</i>
[9:30 – 10:00] Parallel Solution of Sparse Linear Systems Arising in Advection-Diffusion Problems	<i>Luca Bergamaschi, Giorgio Pini, Flavio Sartoretto</i>
[10:00 – 10:30] Parallelization of Implicit-Explicit Runge-Kutta Methods for Cluster of PCs	<i>José Miguel Mantas Ruiz, Pedro González Ródelas, José Antonio Carrillo de la Plata</i>

Thursday, 9:00 – 10:30	Room: 2A	<i>Session 06-2</i>
Grid and Cluster Computing 2		

Session Chair: *Craig Lee*, The Aerospace Corp., USA

[9:00 – 9:30] Virtual Workspaces in the Grid	<i>Katarzyna Keahey, Ian Foster, Tim Freeman, Xuehai Zhang, Daniel Galron</i>
[9:30 – 10:00] Modeling Machine Availability in Enterprise and Wide-area Distributed Computing Environments	<i>Dan Nurmi, John Brevik, Rich Wolski</i>
[10:00 – 10:30] Faults in Large Distributed Systems and What We Can Do About Them	<i>George Kola, Teyfik Kosar, Miron Livny</i>

Thursday, 9:00 – 10:30	Room: 1B	Session 07-2
Parallel Computer Architecture and ILP 2		
Session Chair: <i>Emilio Luque</i> , Universidad Autònoma de Barcelona, Spain		
[9:00 – 9:30] Improving Instruction Delivery with a Block-Aware ISA	<i>Ahmad Zmily, Earl Killian and Christos Kozyrakis</i>	
[9:30 – 10:00] Non-Uniform Instruction Scheduling	<i>Joseph J. Sharkey, Dmitry V. Ponomarev</i>	
[10:00 – 10:30] Instruction Recirculation: Eliminating Counting Logic in Wakeup-Free Schedulers	<i>Joseph J. Sharkey, Dmitry V. Ponomarev</i>	
Thursday, 9:00 – 10:30	Room: 2B	Session 03-2
Scheduling and Load Balancing 2		
Session Chair: <i>Denis Trystram</i> , ID-IMAG, France		
[9:00 – 9:30] A Scalable Parallel Graph Coloring Algorithm for Distributed Memory Computers	<i>Erik G. Boman, Doruk Bozdog, Umit Catalyurek, Assefaw H. Gebremedhin, Fredrik Manne</i>	
[9:30 – 10:00] Complexity and approximation for the precedence constrained scheduling problem with large communication delays	<i>R. Giroudeau, J.C. Konig, F.K. Moulai, J. Palaysi</i>	
[10:00 – 10:30] On Batch-Scheduling Dags for Internet-Based Computing	<i>Grzegorz Malewicz, Arnold L. Rosenberg</i>	
[Coffee Break: 10:30 – 11:00]		
Thursday, 11:0 – 12:30	Room: 1D	Joint Session: Topics 1/2
Support Tools and Environments & Performance Prediction and Evaluation		
Session Chair: <i>Pierre Manneback</i> , Faculté Polytechnique de Mons, Belgium		
[11:00 – 11:30] Modeling Pipeline Applications in POETRIES (<i>topic 01</i>)	<i>Eduardo César, Joan Sorribes, Emilio Luque</i>	
[11:30 – 12:00] Automatic Tuning of Master/Worker Applications (<i>topic 02</i>)	<i>Anna Morajko, Eduardo César, Paola Caymes-Scutari, Tomàs Margalef, Joan Sorribes, Emilio Luque</i>	
[12:00 – 12:30] Performance Cockpit: An Extensible GUI Platform for Performance Tools (<i>topic 02</i>)	<i>Tianchao Li, Michael Gerndt</i>	

Thursday, 11:0 – 12:00	Room: 1A	Session 10-2
		Parallel Numeric Algorithms 2

Session Chair: *Fernando Tinetti*, Universidad Nacional de La Plata, Argentina

[11:00 – 11:30] Comparison of different parallel modified Gram-Schmidt algorithms *Gudula Runger, Michael Schwind*

[11:30 – 12:00] Automatic Tuning of PDGEMM towards Optimal Performance *Sascha Hunold, Thomas Rauber*

Thursday, 11:0 – 12:30	Room: 2A	Session 06-3
		Grid and Cluster Computing 3

Session Chair: *Craig Lee*, The Aerospace Corp., USA

[11:00 – 11:30] A Grid information service based on Peer-to-Peer *Diego Puppini, Stefano Moncelli, Ranieri Baraglia, Nicola Tonellotto, Fabrizio Silvestri*

[11:30 – 12:00] GRUBER: a Grid Resource Usage SLA Broker *Catalin Dumitrescu, Ian Foster*

[12:00 – 12:30] An Architecture for Distributed Grid Brokering *John M. Brooke, Donal K. Fellows*

Thursday, 11:0 – 12:30	Room: 1B	Session 07-3
		Parallel Computer Architecture and ILP 3

Session Chair: *José Moreira*, IBM Thomas J. Watson Research Center, USA

[11:00 – 11:30] Early Experience with Scientific Applications on the Blue Gene/L Supercomputer *George Almasi, Gyan Bhanot, Dong Chen, Maria Eleftheriou, Blake Fitch, Alan Gara, Robert Germain, John Gunnels, Manish Gupta, Philip Heidelberg, Mike Pitman, Aleksandr Rayshubski, James Sexton, Frank Suits, Pavlos Vranas, Bob Walkup, Chris Ward, Yuriy Zhestkov, Alessandro Curioni, Wanda Andreoni, Charles Archer, José Moreira, Richard Loft, Henry Tufo, Theron Voran, and Katherine Riley*

[11:30 – 12:00] A detailed study on phase predictors *Frederik Vandeputte, Lieven Eeckhout, Koen De Bosschere*

[12:00 – 12:30] A Novel Lightweight Directory Architecture for Scalable Shared-Memory Multiprocessors *Alberto Ros Bardisa, Manuel Eugenio Acaacio Sánchez, José Manuel García Carrasco*

Thursday, 11:0 – 12:30

Room: 2B

Session 03-3
Scheduling and Load Balancing 3

Session Chair: *Luís Paulo Santos*, University of Minho, Portugal

[11:00 – 11:30] Scheduling Workflow Distributed Applications in JavaSymphony

Alexandru Jugravu, Thomas Fahringer

[11:30 – 12:00] Tasks Mapping with Quality of Service for Coarse Grain Parallel Applications

Patricia Pascal, Samuel Richard, Bernard Miegemolle, Thierry Monteil

[12:00 – 12:30] Initiating Load Balancing Operations

Marta Beltran, Jose L. Bosque, Antonio Guzman

LUNCH, 12:30 – 14:00

Thursday Afternoon, September 1

Thursday, 14:15 – 15:45

Room: 1D

Session 02-2
Performance Prediction and Evaluation 2

Session Chair: *Allen Malony*, University of Oregon, USA

[14:15 – 14:45] Apex-Map: A Synthetic Scalable Benchmark Probe to Explore Data Access Performance on Highly Parallel Systems

Erich Strohmaier, Hongzhang Shan

[14:45 – 15:15] PerfMiner: Cluster-Wide Collection, Storage and Presentation of Application Level Hardware Performance Data

Philip J. Mucci, Daniel Ahlin, Johan Danielsson, Per Ekman, Lars Malinowski

[15:15 – 15:45] Performance Evaluation of MM5 on Clusters With Modern Interconnects: Scalability and Impact

Ranjit Noronha, Dhableswar K. Panda

Thursday, 14:15 – 15:45	Room: 1A	Session 10-3
		Parallel Numeric Algorithms 3

Session Chair: *Michel Cosnard*, INRIA, France

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| [14:15 – 14:45] Parallelization of Divide-and-Conquer Eigenvector Accumulation | <i>Wilfried Gansterer, Joachim Zottl</i> |
| [14:45 – 15:15] Parallel Order Reduction via Balanced Truncation for Optimal Cooling of Steel Profiles | <i>José M. Badía, Peter Benner, Rafael Mayo, Enrique S. Quintana-Ortí, Gregorio Quintana-Ortí, Jens Saak</i> |
| [15:15 – 15:45] Broadcast-Based Parallel LU Factorization | <i>Fernando G. Tinetti, Armando E. De Giusti</i> |

Thursday, 14:15 – 15:45	Room: 2A	Session 09-2
		Parallel Programming 2

Session Chair: *Marco Danelutto*, University of Pisa, Italy

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| [14:15 – 14:45] An Exception Handling Mechanism for the Concurrent Invocation Statement | <i>Hiu Ning (Angela) Chan, Esteban Pauli, Billy Yan-Kit Man, Aaron W. Keen, Ronald A. Olsson</i> |
| [14:45 – 15:15] smt-SPRINTS: Software Precomputation with Intelligent Streaming for Resource-Constrained SMTs | <i>Tanping Wang, Christos D. Antonopoulos, Dimitrios S. Nikolopoulos</i> |
| [15:15 – 15:45] Symmetric Data Objects and Remote Memory Access Communication for Fortran 95 Applications | <i>Jarek Nieplocha, Doug Baxter, Vinod Tipparaju, Craig Rassmussen, Robert W. Numrich</i> |

Thursday, 14:15 – 15:45	Room: 1B	Session 13-2
		Routing and Communication in Interconnection Networks 2

Session Chair: *Emilio Luque*, Universidad Autònoma de Barcelona, Spain

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| [14:15 – 14:45] Topology-Based Hypercube Structures for Global Communication in Heterogeneous Networks | <i>Silvia Figueira, Vijay Janapa Reddi</i> |
| [14:45 – 15:15] Performance Effects of Node Mappings on the IBM BlueGene/L Machine | <i>Brian Smith, Brett Bode</i> |
| [15:15 – 15:45] INSEE: an Interconnection Network Simulation and Evaluation Environment | <i>F.J. Ridruejo Perez, J. Miguel-Alonso</i> |

Thursday, 14:15 – 15:15	Room: 2B	Session 03-4
Scheduling and Load Balancing 4		

Session Chair: *Luís Paulo Santos*, University of Minho, Portugal

[14:15 – 14:45] Hierarchical scheduling for moldable tasks *Pierre-Francois Dutot*

[14:45 – 15:15] On-line Bicriteria Interval Scheduling *Fabien Baille, Evripidis Bampis, Christian Laforest, Nicolas Thibault*

[Coffee Break: 15:45 – 16:15]

Thursday, 16:15 – 17:45	Room: 1D	Session 02-3
Performance Prediction and Evaluation 3		

Session Chair: *Luís Silva*, University of Coimbra, Portugal

[16:15 – 16:45] A Performance Measurement Infrastructure for Co-Array Fortran *Bernd Mohr, Luiz DeRose, Jeffrey Vetter*

[16:45 – 17:15] Event-based Measurement and Analysis of One-sided Communication *Marc-André Hermanns, Bernd Mohr, Felix Wolf*

[17:15 – 17:45] An Efficient Multi-level Trace Toolkit for Multi-threaded Applications *Vincent Danjean, Raymond Namyst, Pierre-André Wacrenier*

Thursday, 16:15 – 17:45	Room: 1A	Session 16-1
Applications of High-Performance and Grid Computing 1		

Session Chair: *Domenico Laforenza*, Italian National Research Council (CNR), Italy

[16:15 – 16:45] Parallel Linear Space Algorithm for Large-scale Sequence Alignment *Eric Li, Cheng Xu, Tao Wang, Li Jin, Yimin Zhang*

[16:45 – 17:15] Parallel Multiple Sequence Alignment with Decentralized Cache Support *Denis Trystram, Jaroslaw Zola*

[17:15 – 17:45] Parallel Construction of Large Suffix Trees on a PC Cluster *Chunxi Chen, Bertil Schmidt*

Thursday, 16:15 – 17:45	Room: 2A	Session 09-3 Parallel Programming 3
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Session Chair: *Fernando Silva*, University of Porto, Portugal

[16:15 – 16:45] Using Aspects for Supporting Procedural Modules in # Programming	<i>Francisco Heron de Carvalho Junior, Rafael Dueire Lins</i>
[16:45 – 17:15] Multi-threaded testing with AOP is easy, and it finds bugs!	<i>Shady Copty, Shmuel Ur</i>
[17:15 – 17:45] An Investigation of Sharing Strategies for Answer Set Solvers and SAT Solvers	<i>Hung Viet Le, Enrico Pontelli</i>

Thursday, 16:15 – 17:45	Room: 1B	Session 14-3 Mobile and Ubiquitous Computing 3
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Session Chair: *Nuno Preguiça*, Universidade Nova de Lisboa, Portugal

[16:15 – 16:45] Personalized Access to Semantic Web Agents Using Smart Cards	<i>Riza Cenk Erdur, Geylani Kardas</i>
[16:45 – 17:15] Fast and Secure Communication Resume Protocol for Wireless Networks	<i>Kihong Kim, Jinkeun Hong, Jongin Lim</i>
[17:15 – 17:45] On AAA Based on Brokers and Pre-Encrypted Keys in MIPv6	<i>Hoseong Jeon, Min Young Chung, Hyunseung Choo</i>

Thursday, 16:15 – 17:45	Room: 2B	Session 08-2 Distributed Systems and Algorithms 2
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Session Chair: *Luís Rodrigues*, University of Lisbon, Portugal

[16:15 – 16:45] [* Distinguished paper] Replication Predicates for Dependent-failure Algorithms	<i>Flavio Junqueira, Keith Marzullo</i>
[16:45 – 17:15] Consistent Data Replication: Is it feasible in WANs?	<i>Yi Lin, Bettina Kemme, Marta Patiño-Martínez, Ricardo Jiménez-Peris</i>
[17:15 – 17:45] A Hybrid Message Logging-CIC Protocol for Constrained Checkpointability	<i>Françoise Baude, Denis Caromel, Christian Delbé, Ludovic Henrio</i>

17:45– Buses depart to the hotel

Friday Morning, September 2

Friday, 9:00 – 10:30	Room: 1D	<i>Session 02-4</i>
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Performance Prediction and Evaluation 4

Session Chair: *Bernd Mohr*, Research Centre Juelich, Germany

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|---|---|
| [9:00 – 9:30] Knowledge Based Automatic Scalability Analysis and Extrapolation for MPI Programs | <i>Michael Kluge, Andreas Knüpfner and Wolfgang E. Nagel</i> |
| [9:30 – 10:00] Performance Modeling: Understanding the Past and Predicting the Future | <i>David H. Bailey, Allan Snively</i> |
| [10:00 – 10:30] An Approach to Performance Prediction for Parallel Applications | <i>Engin Ipek, Bronis R. de Supinski, Martin Schulz, Sally A. McKee</i> |
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Friday, 9:00 – 10:30	Room: 1A	<i>Session 16-2</i>
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Applications of High-Performance and Grid Computing 2

Session Chair: *Rui Camacho*, University of Porto, Portugal

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|---|---|
| [9:00 – 9:30] Parallel Edge-Based Inexact Newton Solution of Steady Incompressible 3D Navier-Stokes Equations | <i>Renato N. Elias, Marcos A. D. Martins, Alvaro L. G. A. Coutinho</i> |
| [9:30 – 10:00] High Performance Computing for a Financial Application using Fast Fourier Transform | <i>Sajib Barua, Ruppa K. Thulasiram, Parimala Thulasiraman</i> |
| [10:00 – 10:30] Parallel Simulation of the Propagation of Powdery Mildew in a Vineyard | <i>Agnès Calonnec, Guillaume Latu, Jean-Marc Naulin, Jean Roman, Gael Tessier</i> |

Friday, 9:00 – 10:30	Room: 2A	Session 09-4 Parallel Programming 4
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Session Chair: *Paul Kelly*, Imperial College, United Kingdom

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| [9:00 – 9:30] Flexible Skeletal Programming with eSkel | <i>Anne Benoit, Murray Cole, Stephen Gilmore, Jane Hillston</i> |
| [9:30 – 10:00] Dynamic Reconfiguration of Grid-aware applications in ASSIST | <i>M. Aldinucci, A. Petrocelli, E. Pistoletti, M. Torquati, M. Vanneschi, L. Veraldi, C. Zoccolo</i> |
| [10:00 – 10:30] A structured representation for nested-parallel programming languages | <i>A. González-Escribano, Arjan J.C. van Gemund, V. Cardeñoso-Payo</i> |
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Friday, 9:00 – 10:30	Room: 1B	Session 11-1 Distributed and High-performance Multimedia 1
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Session Chair: *Laszlo Boeszoermyeni*, University of Klagenfurt, Austria

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|---|---|
| [9:00 – 9:30] Dynamic distributed collaborative merging policy to optimize the multicasting delivery scheme | <i>Xiao Yuan Yang, Porfidio Hernández, Fernando Cores, Ana Ripoll, Remo Suppi, Emilio Luque</i> |
| [9:30 – 10:00] Dynamic proxy-cache multiplication inside LANs | <i>Claudiu Cobârzan</i> |
| [10:00 – 10:30] Perspective for Lecture Videos | <i>Michael Hartle, Henning Bär, Christoph Trompler, Guido Rößling</i> |
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Friday, 9:00 – 10:30	Room: 2B	Session 15-1 Peer-to-Peer and Web Computing 1
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Session Chair: *Luc Bougé*, ENS Cachan, France

- | | |
|--|--|
| [9:00 – 9:30] Epidemic-style Management of Semantic Overlays for Content-Based Searching | <i>Spyros Voulgaris, Maarten van Steen</i> |
| [9:30 – 10:00] Long Range Contacts in Overlay Networks | <i>Filipe Araújo, Luís Rodrigues</i> |
| [10:00 – 10:30] Combining the use of clustering and scale-free nature of user exchanges into a simple and efficient P2P system | <i>Pierre Fraigniaud, Philippe Gauron, Matthieu Latapy</i> |

[Coffee Break: 10:30 – 11:00]

Friday, 11:00 – 12:30

Room: 1D

Session 08-3

Distributed Systems and Algorithms 3

Session Chair: *Marc Shapiro*, Microsoft Research Cambridge, UK

[11:00 – 11:30] A fault-tolerant token-based mutual exclusion algorithm using a dynamic tree

Julien Sopena, Luciana Arantes, Marin Bertier, Pierre Sens

[11:30 – 12:00] Self-Stabilizing Publish/Subscribe Systems: Algorithms and Evaluation

Gero Mühl, Michael A. Jaeger, Klaus Herrmann, Torben Weis, Andreas Ulbrich, Ludger Fiege

[12:00 – 12:30] A Checkpoint/Recovery Model for Heterogeneous Dataflow Computations Using Work-Stealing

Samir Jafar, Thierry Gautier, Axel Krings, Jean-Louis Roch

Friday, 11:00 – 12:30

Room: 1A

Session 16-3

Applications of High-Performance and Grid Computing 3

Session Chair: *Raymond Bair*, Argonne National Laboratory, USA

[11:00 – 11:30] Parallelism for Perturbation Management and Robust Plans

Jan Ehrhoff, Sven Grothklags, Ulf Lorenz

[11:30 – 12:00] SPH2000: A Parallel Object-Oriented Framework for Particle Simulations with SPH

Sven Ganzenmüller, Simon Pinkenburg, Wolfgang Rosenstiel

[12:00 – 12:30] Grid-BGC: A Grid-Enabled Terrestrial Carbon Cycle Modeling System

Jason Cope, Craig Hartsough, Peter Thornton, Henry M. Tufo, Nathan Wilhelm, Matthew Woitaszek

Friday, 11:00 – 12:30

Room: 2A

Session 13-3

Routing and Communication in Interconnection Networks 3

Session Chair: *José Legatheaux Martins*, Universidade Nova de Lisboa, Portugal

[11:00 – 11:30] Cost / Performance Trade-offs and Fairness Evaluation of Queue Mapping Policies

T. Nachiondo, J. Flich, J. Duato, M. Gusat

[11:30 – 12:00] On the Correct Sizing on Meshes through an Effective Congestion Management Strategy

P.J. García, J. Flich, J. Duato, F.J. Quiles, I. Johnson, F. Naven

[12:00 – 12:30] A New Hardware Efficient Link Scheduling Algorithm to Guarantee QoS on Clusters

J.M. Claver, M.C. Carrión, M. Canseco, M.B. Caminero, F.J. Quiles

Friday, 11:00 – 12:00

Room: 1B

Session 11-2

Distributed and High-performance Multimedia 2

Session Chair: *Nuno Correia*, Universidade Nova de Lisboa, Portugal

[11:00 – 11:30] A Scene-based Bandwidth Allocation Scheme for Transferring VBR-encoded Videos *Dafu Deng, Hai Jin*

[11:30 – 12:00] DCT Block Conversion for H.264/AVC video transcoding *Joo-Kyong Lee, Ki-Dong Chung*

Friday, 11:00 – 12:30

Room: 2B

Session 15-2

Peer-to-Peer and Web Computing 2

Session Chair: *Henrique João Domingos*, Universidade Nova de Lisboa, Portugal

[11:00 – 11:30] Pastis: a Higly-Scalable Multi-User Peer-to-Peer File System *Jean-Michel Busca, Fabio Picconi, Pierre Sens*

[11:30 – 12:00] AGNO: An Adaptive Group Communication Scheme for Unstructured P2P Networks *Dimitrios Tsoumakos, Nick Roussopoulos*

[12:00 – 12:30] Semantic Peer-to-Peer Overlays for Publish/Subscribe Networks *Raphael Chand, Pascal Felber*

LUNCH, 12:30 – 14:00

Friday Afternoon, September 2

Friday, September 2, 14:15 – 14:45 Room: 1D

Euro-Par 2006

Raymond Bair*(Argonne National Laboratory)**Science on a Large Scale*

Abstract. The TeraGrid, the U.S. National Science Foundation's multi-year project to build a distributed national cyberinfrastructure, entered full production mode in the fall of 2004, providing a coordinated set of services for the science and engineering community. TeraGrid operates a unified user support infrastructure and software environment across its eight resource partner sites, which together provide more than 40 teraflops of computing capability and mass storage capability in the petabytes, linked by networks operating at tens of Gigabit/sec. This unified environment allows TeraGrid users to access storage and information resources as well as over a dozen major computing systems via a single allocation, either as stand-alone resources or as components of a distributed application using Grid software capabilities. Many lessons can be drawn from the dual pursuit of high performance and close integration. The next phase will be even more exciting, with the roll out of a wide range of science gateways and additional advanced applications. Science gateway projects are aimed at supporting access to TeraGrid via web portals, desktop applications or via other grids. An initial set of 10 gateways will address new scientific opportunities in fields from bioinformatics to nanotechnology as well as interoperation between TeraGrid and other Grid infrastructures.

TeraGrid is also enabling an impressive array of large scale science applications, where researchers can perform complex simulations and manipulate enormous data sets in novel ways to gain new insights into research questions and societal problems, for example, finding the most efficient and least expensive ways to clean up groundwater pollution.

Effort in these and other related areas will allow more researchers and educators access to TeraGrid capabilities and advance compatibility between TeraGrid and other major Grid deployments such as Open Science Grid, Network for Earthquake Engineering Simulation (NEES), and major European and Asian Grid deployments.

Brief Curriculum Vitae. Dr. Raymond Bair's research interests lie at the confluence of computer science, computational and laboratory research, with an emphasis on large scale applications of high performance computing and communications. Dr. Bair earned his Ph.D. in Chemistry at Caltech, with a focus on high performance quantum chemistry methods and their applications. At BioDesign, he led development of interactive molecular modeling software for the pharmaceutical, chemical and polymer industries. At Pacific Northwest National Laboratory he was instrumental in establishing the Molecular Science Computing Facility for DOE's new Environmental Molecular Sciences Laboratory. He also lead EMSL's Computing and Information Sciences Directorate, with R&D in collaboratories, instrument development, high performance computing, and scientific data management. Presently, Dr. Bair is a Senior Computational Scientist for Applications at Argonne National Laboratory. He directs the Laboratory Computing Resource Center, coordinates TeraGrid science efforts, and helps develop new computing facilities. His research is funded by the U.S. Department of Energy and the U.S. National Science Foundation.

Friday, 16:15 – 17:15

Room: 1D

Keynote Speaker

José E. Moreira
(IBM)

The Evolution of the Blue Gene/L Supercomputer

Abstract. The Blue Gene project started in the final months of 1999. Five years later, during the final months of 2004, the first Blue Gene/L machines were being installed at customers. By then, Blue Gene/L had already established itself as the fastest computer in the planet, topping the TOP500 list with the breathtaking speed of over 70 Teraflops. Since the beginning of 2005, many other systems have been installed at customers, the flagship machine at Lawrence Livermore National Laboratory has greatly increased in size, and Blue Gene/L has established itself as a machine capable of breakthrough science. We here examine how Blue Gene/L came to be. We describe how some key technical decisions were made that shaped the overall hardware and software architecture of this machine. We also describe the nature of the interactions between the teams inside and outside IBM that led to Blue Gene/L being such a successful venture. Finally, we explain why this is just the beginning, and why there is more excitement ahead of us than behind us in the Blue Gene project.

Brief Curriculum Vitae. IBM Systems and Technology Group, Rochester, MN, jmoreira@us.ibm.com
José E. Moreira received B.S. degrees in physics and electrical engineering in 1987 and an M.S. degree in electrical engineering in 1990, all from the University of Sao Paulo, Brazil. He received his Ph.D. degree in electrical engineering from the University of Illinois at Urbana-Champaign in 1995. Since joining IBM in 1995, he has been involved in several high-performance computing projects, including the Teraflop-scale ASCI Blue-Pacific, ASCI White, and Blue Gene/L. Dr. Moreira was a manager at the IBM Thomas J. Watson Research Center from 2001 to 2004 and he is currently the Software Systems Architect for the IBM e-server Blue Gene solution. Dr. Moreira is the author of over 70 publications on high-performance computing. He has served in various thesis committees and has been the chair or vice-chair of several international conferences and workshops. Dr. Moreira is responsible for defining the technical characteristics of the IBM e-server Blue Gene solution, which started shipping to customers in the last quarter of 2004. Over 500 Teraflops of Blue Gene/L computing capacity have been installed at multiple sites in the US, Europe, and Japan. In his job, Dr. Moreira interacts closely with software developers, hardware developers, system installers, and customers to guarantee that the delivered systems work effectively and accomplish their intended missions successfully.

Friday, September 2, 17:15 – 17:30 Room: 1D

Closing Session

17:45 – Buses depart to the hotel

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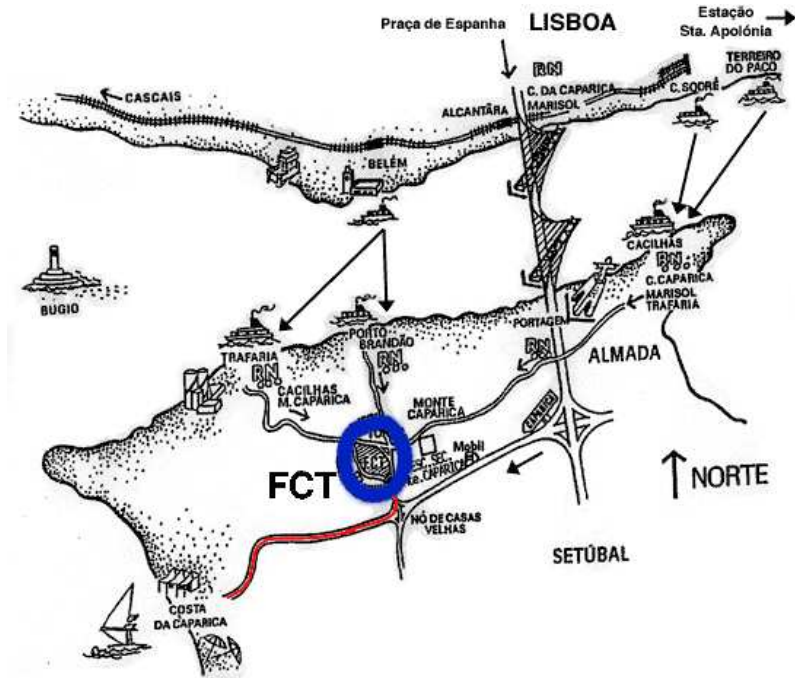
GridCoord



CoreGRID

8 Annexes

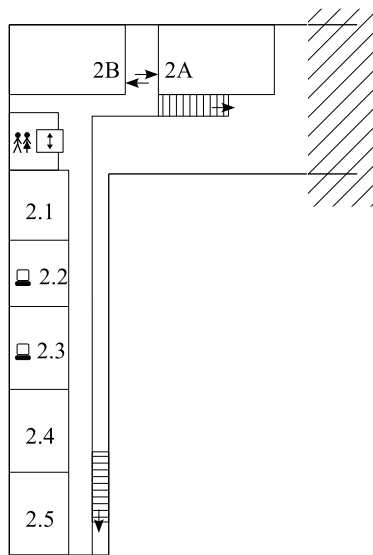
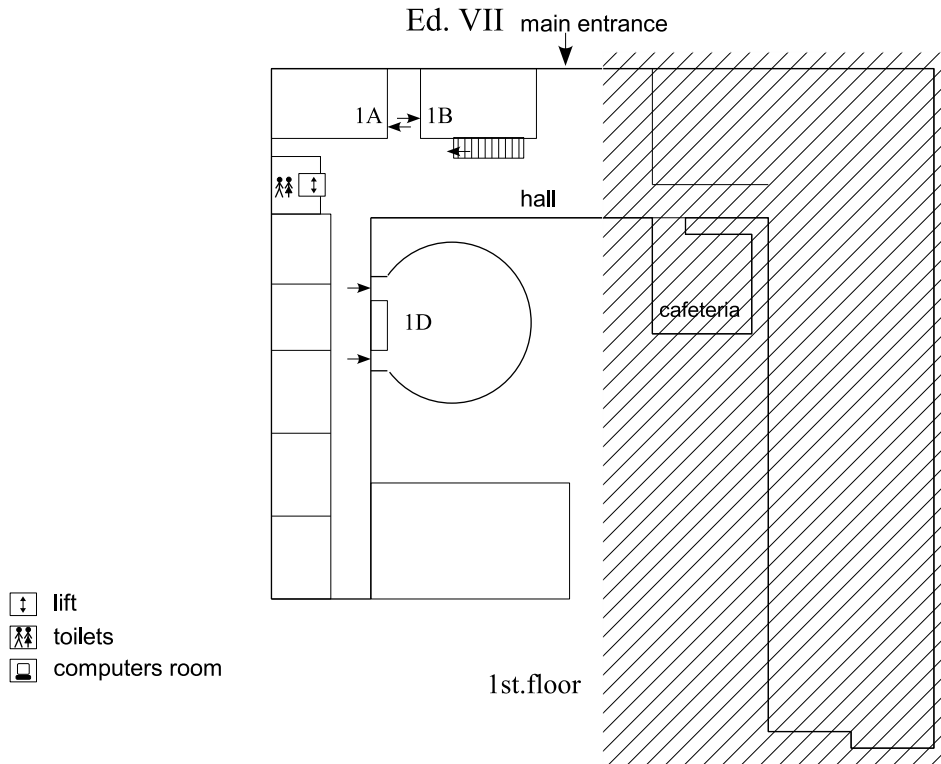
8.1 Tagus River and the South Margin



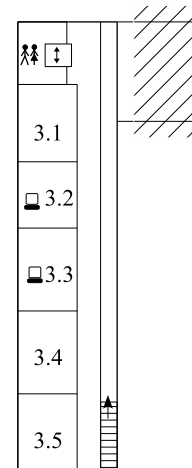
8.2 FCT/UNL Campus



8.3 Conference Building (Ed. VII)



2nd.floor



3rd.floor