



26th International Symposium on DIStributed Computing

October 15 – 19, 2012
Salvador – Bahia – Brazil

SYMPOSIUM GUIDE

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WELCOME MESSAGE FROM THE ORGANIZING COMMITTEE CHAIR

Dear Participants,

It is our great pleasure to welcome you to DISC 2012 and the city of Salvador.

In this guide you will find information on all activities related to DISC 2012: paper and keynote presentations, business meeting, tutorials, a workshop, and social events. The schedule for the activities was organized to allow DISC's participants to attend as many activities as possible, avoiding parallel events.

The activities related to DISC 2012 start with tutorials and a welcome reception in the university campus. The DISC main track (paper presentation and keynotes) and the Workshop on Advances on Distributed Graph Algorithms take place in the following days at the Pestana hotel. This guide includes maps and directions for both locations.

The technical activity of DISC is complemented by a carefully planned social event that includes a tour along the historic center of Salvador, followed by the conference banquet. With these social events we hope to provide attendees with a broad view of Salvador old town, the first Brazilian capital, and one of the oldest cities in the Americas.

DISC 2012 was organized by the Distributed Systems Laboratory (LaSiD) at UFBA. Organizing a traditional event such as DISC would not be possible without the committed work of many people and the support of several institutions. We are grateful to the volunteering work of our colleagues of the organizing committee and student team, as well as the staff of LaSiD. Working with this people was a valuable and truly rewarding experience.

The financial support from CAPES (Brazilian Agency for Higher Education) was vital for the success of this event. We also acknowledge the financial support from Microsoft Research and institutional support from SBC (Brazilian Computer Society), EATCS (European Association for Theoretical Computer Science), and Federal University of Bahia.

Finally, we thank the DISC Steering Committee (SC) for having given us the opportunity to organize DISC 2012. Working with the SC as well as with the Program Chair, Marcos K. Aguilera, was indeed extremely gratifying.

We wish you all the best during the symposium, and hope that you will have time during your visit to explore and enjoy our city.



Raimundo Macêdo
DISC 2012 Organizing Chair
<http://www.macedo.ufba.br/>

WELCOME MESSAGE FROM THE PROGRAM COMMITTEE CHAIR

Welcome to DISC 2012!

DISC is the International Symposium on Distributed Computing, an international forum on the theory, design, analysis, implementation, and application of distributed systems and networks.

This year, the symposium received 112 regular paper submissions, of which 27 were selected for regular presentations at the symposium. The symposium also received 7 brief announcement submissions. Among these submissions and the regular paper submissions, 24 submissions were selected to appear as brief announcements. Each brief announcement reflects ongoing work or recent results, and it is expected that these brief announcements will appear as full papers in other conferences or journals.

The symposium has keynote presentations by Yehuda Afek and Simon Peyton-Jones. In addition, there are tutorials by Nicola Santoro, Paulo Verissimo, Elias P. Duarte Jr., and Michel Raynal.

The Best Paper Award goes to Mika Göös and Jukka Suomela for the paper titled “No Sublogarithmic-Time Approximation Scheme for Bipartite Vertex Cover”.

The Best Student Paper Award goes to Boris Korenfeld and Adam Morrison for the paper titled “CBTree: A Practical Concurrent Self-Adjusting Search Tree”, which is co-authored with Yehuda Afek, Haim Kaplan, and Robert E. Tarjan.

The symposium is co-located with the Workshop on Advances in Distributed Graph Algorithms (ADGA), organized by Amos Korman.

On behalf of the entire DISC 2012 Program Committee, I hope you enjoy the program. Please let any of us know if you have any comments or suggestions for the future.



Marcos K. Aguilera
Program Committee Chair
<http://research.microsoft.com/en-us/people/aguilera>

CONFERENCE VENUES

DISC 2012 activities will be held at Institute of Mathematics of Federal University of Bahia (UFBA) and Pestana Bahia Hotel.

Federal University of Bahia (UFBA – Universidade Federal da Bahia)
Auditorium – Institute of Mathematics (Instituto de Matemática)
Av. Adhemar de Barros, s/n – Campus Ondina
Parking places: entrance (portaria) 01



Pestana Bahia Hotel
Room: Fernando Pessoa I
Rua Fonte do Boi, 216 – Rio Vermelho neighborhood



USEFUL MAPS

Route between Pestana Bahia Hotel and UFBA campus



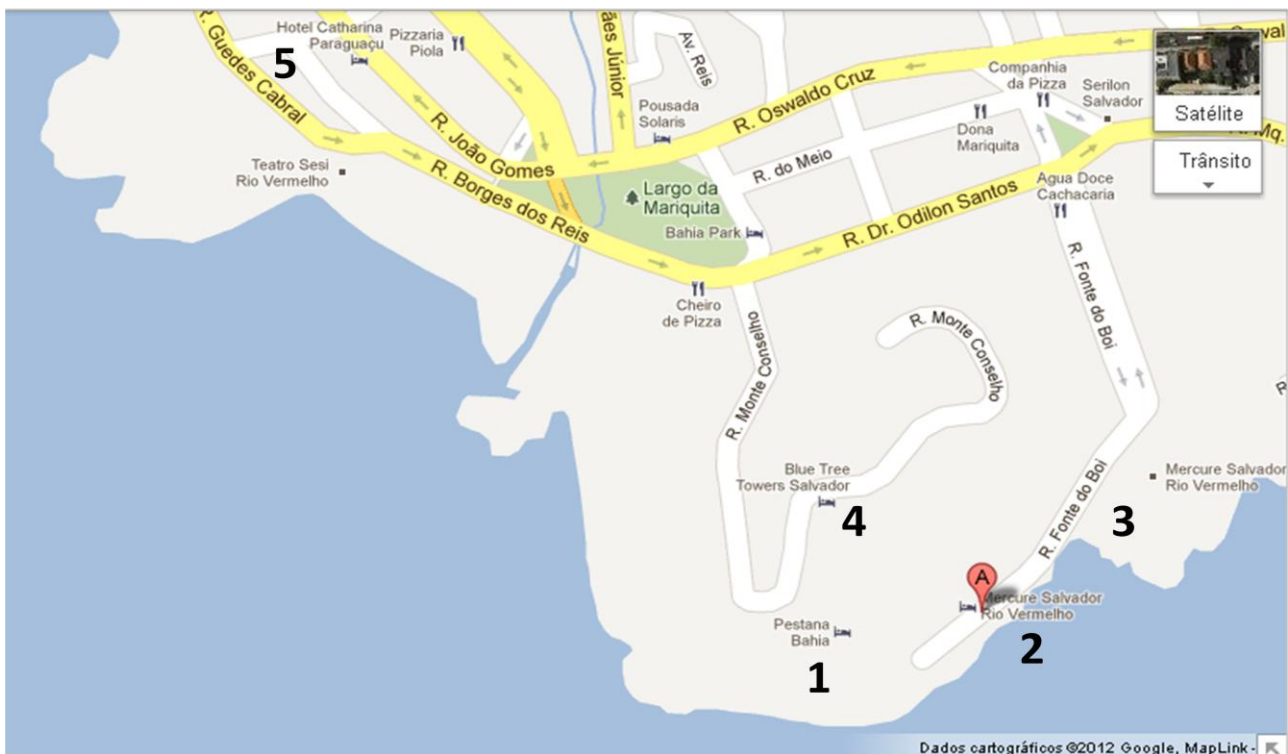
A – Pestana Bahia Hotel

Rua Fonte do Boi => Rua Dr. Odilon Santos => Rua Marquês de Monte Santo =>
Rua Oswaldo Cruz => Rua João Gomes => Largo de Santana => Av. Oceânica =>
Av. Adhemar de Barros

B – UFBA campus – Entrance (portaria 01) – parking places: CPD / Institute of Mathematics
4,6 km, 15 minutes

USEFUL MAPS

Rio Vermelho neighborhood



Hotels

- 1- Pestana Bahia (conference venue)
- 2- Ibis
- 3- Mercure
- 4- Gold Tulip
- 5- Catharina Paraguaçu

Restaurants

- Manjeriçã (vegetarian) – Rua Fonte do Boi, 3B
Confraria das Ostras – Rua Fonte do Boi, 8
Sushi Deli (japanese) – Rua Fonte do Boi, 16
Dona Mariquita (regional) – Rua do Meio, 178
Fogo de Chão (steak house) – Praça Colombo, 4 – Largo da Mariquita
Água Doce Cachaçaria (140 labels of *cachaça*) – Rua Fonte do Boi, 32
Boteco do França (snacks and hot food) – Rua Borges dos Reis, 24-A (near Teatro do SESI)

Snack points

- Acarajé da Cira (*acarajé* and *abará*) – Largo da Mariquita
Acarajé da Dinha (*acarajé* and *abará*) – Largo Santana

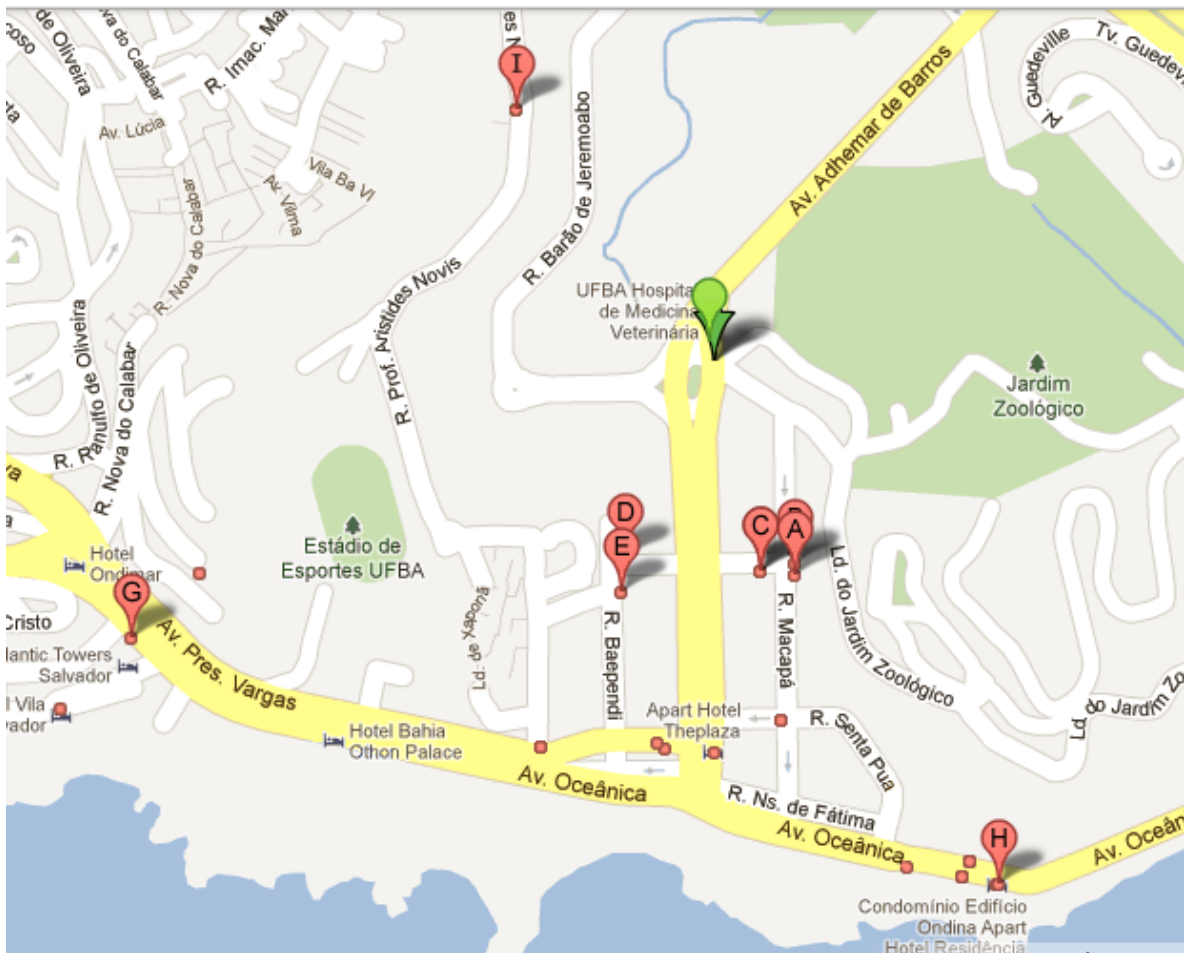
Cachaça is a distilled drink made from sugar cane. It is used to prepare “caipirinha”.

Acarajé is a kind of fried cake made with black-eyed (*fradinho*) beans, shrimp, vatapá and tomatoes. You can have it “quente” (with pepper) or “frio” (no pepper).

Abará: the same as *acarajé*, but cooked instead of fried.

USEFUL MAPS

Ondina neighborhood



Restaurants

A – Di Liana (italian) – Rua Macapá, 314

B – Maria Bonita (regional) – Rua Macapá, 328

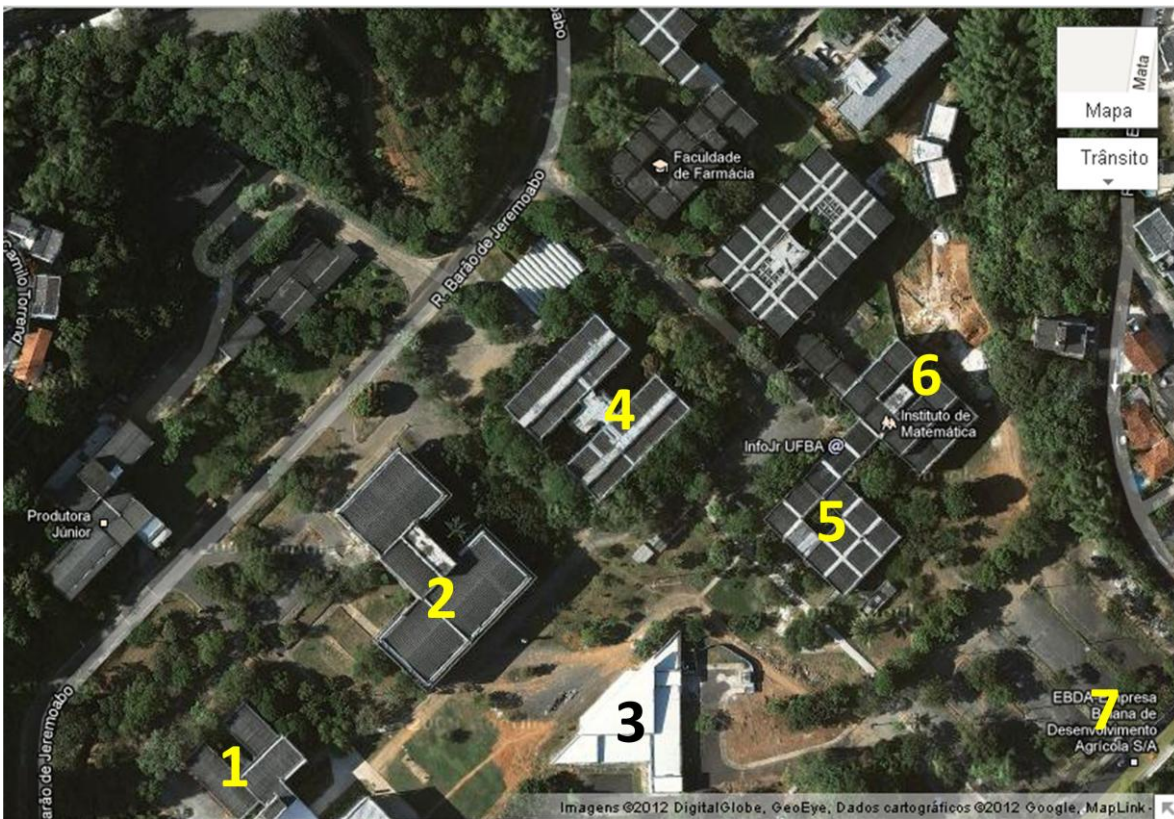
C – Vida (vegetarian/soup) – Travessa Macapá, 66

E – Stalo (buffet) – Rua Baependi, 222

G – Alfredo di Roma (italian) – Rua do Morro do Escravo Miguel, Hotel Atlantic Towers

USEFUL MAPS

Detailed map of UFBA campus



- 1 – PAF 3 (Pavilhão de Aulas da Federação) / Institute of Arts (Letras) / **Restaurant**
- 2 – Campus library (Biblioteca Universitária Reitor Macedo Costa)
- 3 – Restaurante Universitário
- 4 – Institute of Biology (Biologia) / **Restaurant**
- 5 – CPD and LaSiD
- 6 – Institute of Mathematics (**conference venue**), bank ATMs (Banco do Brasil, Santander)
- 7 – Parking places: entrance (portaria) 01



Main entrance



Parking places: entrance (portaria 01)

GENERAL INFORMATION

The International Symposium on DIStributed Computing (DISC) is an international forum on the theory, design, analysis, implementation and application of distributed systems and networks.

DISC 2012 is organized by the Distributed Systems Laboratory (LaSiD) at Federal University of Bahia (UFBA), in cooperation with European Association for Theoretical Computer Science (EATCS) and Brazilian Computer Society (SBC).

DISC 2012 will feature:

- Keynotes lectures by Yehuda Afek and Simon Peyton-Jones
- Workshop on Advances on Distributed Graph Algorithms (ADGA), chaired by Amos Korman
- Four tutorials, chaired by Raimundo Macêdo
- Nine sessions for regular paper presentations
- Two sessions for brief announcement presentations
- Principles of Distributed Computing doctoral dissertation award, chaired by Faith Ellen
- Tour to Pelourinho and Historic Center

15 th October	16 th October	17 th October	18 th October	19 th October
Tutorials 1, 2, 3	DISC day 1	DISC day 2	DISC day 3	ADGA workshop
Welcome reception	Business meeting	Social events	Tutorial 4	

DISC 2012 PROGRAM

Monday, October 15th

Location: Auditorium, Institute of Mathematics, Federal University of Bahia (UFBA)

08:00 – 08:30	Registration	Auditorium's foyer
08:30 – 10:00	Tutorial 1: An introduction to distributed computing by mobile entities: agents, robots, sensors. Nicola Santoro (School of Computer Science, Carleton University, Canada)	Auditorium
10:00 – 10:20	Coffee-break	
10:20 – 11:20	Tutorial 1: An introduction to distributed computing by mobile entities: agents, robots, sensors. Nicola Santoro (School of Computer Science, Carleton University, Canada)	
11:20 – 11:30	Interval	
11:30 – 12:30	Tutorial 2: Beyond the glamour of Byzantine fault tolerance: OR why resisting intrusions means more than BFT. Paulo Veríssimo (Faculty of Sciences, University of Lisbon, Portugal)	
12:30 – 14:00	Lunch	
14:00 – 15:30	Tutorial 2: Beyond the glamour of Byzantine fault tolerance: OR why resisting intrusions means more than BFT. Paulo Veríssimo (Faculty of Sciences, University of Lisbon, Portugal)	
15:30 – 15:50	Coffee-break	
15:50 – 17:20	Tutorial 3: System-level diagnosis: a stroll through 45 years of research on diagnosable systems. Elias P. Duarte Jr. (Federal University of Paraná, Brazil)	
17:20 – 17:30	Interval	
17:30 – 18:30	Tutorial 3: System-level diagnosis: a stroll through 45 years of research on diagnosable systems. Elias P. Duarte Jr. (Federal University of Paraná, Brazil)	
18:30 – 20:30	Welcome reception	Auditorium's foyer

Tuesday, October 16th – DISC DAY 1

Location: Room Fernando Pessoa I, Pestana Bahia Hotel

08:00 – 08:30	Registration	
08:30 – 08:45	Opening remarks and awards	Room: Fernando Pessoa I
08:45 – 10:00	Regular Paper Session 1: SHARED MEMORY I	
08:45 – 09:10	<i>CBTree: A Practical Concurrent Self-Adjusting Search Tree</i> Yehuda Afek, Haim Kaplan, Boris Korenfeld, Adam Morrison, Robert E. Tarjan	
09:10 – 09:35	<i>Efficient Fetch-and-Increment</i> Faith Ellen, Vijaya Ramachandran, Philipp Woelfel	
09:35 – 10:00	<i>Show No Weakness: Sequentially Consistent Specifications of TSO Libraries</i> Alexey Gotsman, Madanlal Musuvathi, Hongseok Yang	
10:00 – 10:20	Coffee-break	
10:20 – 11:35	Regular Paper Session 2: MOBILE AGENTS AND OVERLAY NETWORKS	
10:20 – 10:45	<i>Collecting Information by Power-Aware Mobile Agents</i> Julian Anaya, Jeereemie Chalopin, Jurek Czyzowicz, Arnaud Labourel, Andrzej Pelc, Yann Vaxes	
10:45 – 11:10	<i>Memory Lower Bounds for Randomized Collaborative Search and Implications for Biology</i> Ofer Feinerman, Amos Korman	
11:10 – 11:35	<i>A Generalized Algorithm for Publish/Subscribe Overlay Design and its Fast Implementation</i> Chen Chen, Roman Vitenberg, Hans-Arno Jacobsen	
11:35 – 11:45	Interval	
11:45 – 12:45	Brief Announcements Session 1 <i>Wait-Free Gathering of Mobile Robots</i> Zohir Bouzid, Shantanu Das, Sebastien Tixeuil <i>Distributed Exclusive and Perpetual Tree Searching</i> Lelia Blin, Janna Burman, Nicolas Nisse <i>Reaching Approximate Byzantine Consensus in Partially-Connected Mobile Networks</i> Chuanyou Li, Michel Hurfin, Yun Wang <i>Distributed Algorithms for Maximum Link Scheduling in the Physical Interference Model</i> Guanhong Pei, Anil Kumar S. Vullikanti	

	<p><i>A Fast Distributed Approximation Algorithm for Minimum Spanning Trees in the SINR Model</i> Maleq Khan, Gopal Pandurangan, Guanhong Pei, Anil Kumar S. Vullikanti</p> <p><i>Deterministic Protocol for the Membership Problem in Beeping Channels</i> Bojun Huang</p> <p><i>Probabilistic Stabilization under Probabilistic Schedulers</i> Yukiko Yamauchi, Sebastien Tixeuil, Shuji Kijima, Masafumi Yamashita</p> <p><i>An Analysis Framework for Distributed Hierarchical Directories</i> Gokarna Sharma, Costas Busch</p> <p><i>Flooding in Dynamic Graphs with Arbitrary Degree Sequence</i> Herve Baumann, Pierluigi Crescenzi, Pierre Fraigniaud</p> <p><i>Node Sampling Using Centrifugal Random Walks</i> Andres Sevilla, Alberto Mozo, Antonio Fernandez Anta</p> <p><i>Concurrent Wait-Free Red-Black Trees</i> Aravind Natarajan, Lee Savoie, Neeraj Mittal</p> <p><i>A Contention-Friendly, Non-Blocking Skip List</i> Tyler Crain, Vincent Gramoli, Michel Raynal</p>	
12:45 – 14:15	Lunch	
14:15 – 15:30	Regular Paper Session 3: WIRELESS AND MULTIPLE ACCESS CHANNEL NETWORKS	
14:15 – 14:40	<i>Bounded-Contention Coding for Wireless Networks in the High SNR Regime</i> Keren Censor-Hillel, Bernhard Haeupler, Nancy Lynch, Muriel Medard	
14:40 – 15:05	<i>Distributed Backbone Structure for Algorithms in the SINR Model of Wireless Networks</i> Tomasz Jurdzinski, Dariusz R. Kowalski	
15:05 – 15:30	<i>Distributed Online and Stochastic Queuing on a Multiple Access Channel</i> Marcin Bienkowski, Tomasz Jurdzinski, Mirosław Korzeniowski, Dariusz R. Kowalski	
15:30 – 15:50	Coffee-break	
15:50 – 16:50	Keynote 1: LAUNCHING ACADEMIC IDEAS INTO THE REAL WORLD. Prof. Yehuda Afek (Blavatnik School of Computer Sciences, Tel-Aviv University)	
16:50 – 17:00	Interval	
17:00 – 18:00	Business Meeting	

Wednesday, October 17th – DISC DAY 2

Location: Room Fernando Pessoa I, Pestana Bahia Hotel

08:30 – 09:45	Regular Paper Session 4: DYNAMIC NETWORKS	Room: Fernando Pessoa I
08:30 – 08:55	<i>Fast Distributed Computation in Dynamic Networks via Random Walks</i> Atish Das Sarma, Anisur Rahaman Molla, Gopal Pandurangan	
08:55 – 09:20	<i>Dense Subgraphs on Dynamic Networks</i> Atish Das Sarma, Ashwin Lall, Danupon Nanongkai, Amitabh Trehan	
09:20 – 09:45	<i>Lower Bounds on Information Dissemination in Dynamic Networks</i> Bernhard Haeupler, Fabian Kuhn	
09:45 – 10:05	Coffee-break	
10:05 – 11:05	Brief Announcements Session 2 <i>Consensus and Efficient Passive Replication</i> Flavio Junqueira, Marco Serafini <i>Anonymity, Failures, Detectors and Consensus</i> Zohir Bouzid, Corentin Travers <i>Do VNet Embeddings Leak Information about ISP Topology?</i> Yvonne-Anne Pignolet, Stefan Schmid, Gilles Tredan <i>Efficient Private Distributed Computation on Unbounded Input Streams</i> Shlomi Dolev, Juan Garay, Niv Gilboa, Vladimir Kolesnikov, Yelena Yuditsky <i>Fast Travellers: Infrastructure-Independent Deadlock Resolution in Resource-Restricted Distributed Systems</i> Sebastian Ertel, Christof Fetzer, Michael J. Beckerle <i>Hashed Predecessor Patricia Trie---A Data Structure for Efficient Predecessor Queries in Peer-to-Peer Systems</i> Sebastian Kniesburges, Christian Scheideler <i>Naming and Counting in Anonymous Unknown Dynamic Networks</i> Othon Michail, Ioannis Chatzigiannakis, Paul G. Spirakis <i>SplayNets Towards Self-Adjusting Distributed Data Structures</i> Stefan Schmid, Chen Avin, Christian Scheideler, Bernhard Haeupler, Zvi Lotker <i>Semantics of Eventually Consistent Replicated Sets</i> Annette Bieniusa, Marek Zawirski, Nuno Preguica, Marc Shapiro, Carlos Baquero, Valter Balegas, Sergio Duarte <i>Decoupled and Consensus-Free Reconfiguration for Fault-Tolerant Storage</i> Eduardo Alchieri, Alysson Bessani, Fabiola Greve, Joni Fraga <i>Atomic Consistency and Partition Tolerance in Scalable Key-Value Stores</i> Cosmin Arad, Tallat M. Shafaat, Seif Haridi <i>Weighted Partial Message Matching for Implicit Multicast Systems</i> William Culhane, K. R. Jayaram, Patrick Eugster	

11:05 – 11:15	Interval	
11:15 – 12:30	Regular Paper Session 5: DISTRIBUTED GRAPH ALGORITHMS	
11:15 – 11:40	<i>No Sublogarithmic-Time Approximation Scheme for Bipartite Vertex Cover</i> Mika Goos, Jukka Suomela	
11:40 – 12:05	<i>"Tri, Tri Again": Finding Triangles and Small Subgraphs in a Distributed Setting</i> Danny Dolev, Christoph Lenzen, Shir Peled	
12:05 – 12:30	<i>Distributed 2-Approximation Algorithm for the Semi-Matching Problem</i> Andrzej Czygrinow, Michal Hanckowiak, Edyta Szymanska, Wojciech Wawrzyniak	
12:30 – 14:00	Lunch	
14:00 – 15:15	Regular Paper Session 6: WIRELESS AND LOOSELY CONNECTED NETWORKS	
14:00 – 14:25	<i>Counting-Based Impossibility Proofs for Renaming and Set Agreement</i> Hagit Attiya, Ami Paz	
14:25 – 14:50	<i>Efficient Symmetry Breaking in Multi-Channel Radio Networks</i> Sebastian Daum, Fabian Kuhn, Calvin Newport	
14:50 – 15:15	<i>On Byzantine Broadcast in Loosely Connected Networks</i> Alexandre Maurer, Sebastien Tixeuil	
15:30 – 19:00	Tour to Pelourinho and Historic Center	
19:30 – 22:30	Conference dinner	

Thursday, October 18th – DISC DAY 3

Location: Room Fernando Pessoa I, Pestana Bahia Hotel

09:00 – 10:15	Regular Paper Session 7: SHARED MEMORY II	Room: Fernando Pessoa I
09:00 – 09:25	<i>RMR-Efficient Randomized Abortable Mutual Exclusion</i> Abhijeet Pareek, Philipp Woelfel	
09:25 – 09:50	<i>Abortable Reader-Writer Locks are No More Complex Than Abortable Mutex Locks</i> Prasad Jayanti, Zhiyu Liu	
09:50 – 10:15	<i>Pessimistic Software Lock-Elision</i> Yehuda Afek, Alexander Matveev, Nir Shavit	
10:15 – 10:35	Coffee-break	
10:35 – 11:35	Keynote 2: TOWARDS HASKELL IN THE CLOUD Simon Peyton-Jones (Microsoft Research, Cambridge, England)	
11:35 – 11:45	Interval	
11:45 – 13:00	Regular Paper Session 8: ROBOTS	
11:45 – 12:10	<i>Asynchronous Pattern Formation by Anonymous Oblivious Mobile Robots</i> Nao Fujinaga, Yukiko Yamauchi, Shuji Kijima, Masafumi Yamashita	
12:10 – 12:35	<i>How to Gather Asynchronous Oblivious Robots on Anonymous Rings</i> Gianlorenzo D'Angelo, Gabriele Di Stefano, Alfredo Navarra	
12:35 – 13:00	<i>Position Discovery for a System of Bouncing Robots</i> Jurek Czyzowicz, Leszek Gasieniec, Adrian Kosowski, Evangelos Kranakis, Oscar Morales Ponce, Eduardo Pacheco	
13:00 – 14:30	Lunch	
14:30 – 15:45	Regular Paper Session 9: LOWER BOUNDS AND SEPARATION	
14:30 – 14:55	<i>Bounds on Contention Management in Radio Networks</i> Mohsen Ghaffari, Bernhard Haeupler, Nancy Lynch, Calvin Newport	
14:55 – 15:20	<i>Randomized Distributed Decision</i> Pierre Fraigniaud, Amos Korman, Merav Parter, David Peleg	
15:20 – 15:45	<i>The Strong At-Most-Once Problem</i> Sotirios Kentros, Chadi Kari, Aggelos Kiayias	
15:45 – 16:05	Coffee-break	

16:05 – 17:35	Tutorial 4: Implementing concurrent objects in multiprocessor machines. Michel Raynal (University of Rennes, France)	
17:35 – 17:45	Interval	
17:45 – 18:45	Tutorial 4: Implementing concurrent objects in multiprocessor machines. Michel Raynal (University of Rennes, France)	

Friday, October 19th

Location: Room Fernando Pessoa I, Pestana Bahia Hotel

08:30 – 17:10	ADGA workshop	Room: Fernando Pessoa I
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WORKSHOP ON ADVANCES ON DISTRIBUTED GRAPH ALGORITHMS (ADGA)

LOCATION: Pestana Bahia Hotel - Rua Fonte do Boi, 216 – Rio Vermelho neighborhood		
CHAIR: Amos Korman (CNRS and University of Paris Diderot, France)		
08:30 – 09:30	Global solutions based on local information. Fabian Kuhn (University of Lugano, Switzerland)	Room: Fernando Pessoa I
09:30 – 09:50	Coffee break	
09:50 – 10:50	To use ID or not to use ID, is that a question? Pierre Fraigniaud (University Paris Diderot, France)	
10:50 – 11:10	Interval	
11:10 – 12:10	Distributed computing on the (fruit) fly Yuval Emek (ETH Zurich, Switzerland)	
12:10 – 13:30	Lunch	
13:30 – 14:30	Self-stabilizing distributed data structures Christian Scheideler (University of Paderborn, Germany)	
14:30 – 14:50	Interval	
14:50 – 15:50	Rumor spreading George Giakkoupis (ASAP team, IRISA/INRIA Rennes, France)	
15:50 – 16:10	Coffee-break	
16:10 – 17:10	Progress and challenges for labeling schemes Cyril Gavoille (University of Bordeaux, France)	

KEYNOTES SPEAKERS



Keynote 1: **Launching academic ideas into the real world**

Yehuda Afek (Blavatnik School of Computer Sciences, Tel-Aviv University)
<http://www.cs.tau.ac.il/~afek/>

In Feb 2000, a massive distributed denial of service (DDoS) attack took down Yahoo, Amazon, Ebay, CNN and other major web sites for hours, some of us were rushed to the white-house to discuss solutions with President Bill Clinton. The estimated total damage was about 1.2 Trillion dollars. There was need for a novel distributed computing based algorithmic solution, and a fast transition of this algorithm into the real world. In December of 2001 the Riverhead guard was launched, stopping a few DDoS attacks. In December of 2003 it brought back up a Top-5 web company that was taken down by a massive DDoS attack. Since then, the Guard algorithm has protected thousands of Internet services, some of which require 24x7 coverage since they are under continuous multi Gbps DDoS attacks. I like to think that it has made the Internet a safer place. This talk will describe the process and my experiences in moving the guard algorithm from theory to practice.



Keynote 2: **Towards Haskell in the cloud**

Simon Peyton-Jones (Microsoft Research, Cambridge, England)
<http://research.microsoft.com/en-us/people/simonpj/>

Haskell is a great language for writing parallel applications, but until now "parallel" has always meant "shared memory". The obvious paradigm for cloud applications in Haskell is actor-style concurrency based on message passing; Erlang is the brand leader here. In this talk I'll describe how we've implemented an Erlang-style concurrency library in Haskell. Of course this isn't a new idea: Scala Actors and Akka do something very similar in Scala, although there are some interesting differences in the details. More fundamentally, we have not done this before in Haskell because of a key obstacle, namely serialising arbitrary closures. The main technical contribution of the talk is an elegant way to solve this problem, exploiting (yet again) the type system to good effect.

TUTORIALS



Tutorial 1: **An introduction to distributed computing by mobile entities: agents, robots, sensors**

Nicola Santoro (School of Computer Science, Carleton University, Canada)
<http://people.scs.carleton.ca/~santoro/>

Distributed computing is the study of the computational and complexity issues arising in systems of autonomous computational entities interacting with each other (e.g. to solve a problem, to perform a task). Traditionally the entities have been assumed to be *stationary*. However, there is a large and varied class of distributed environments where the interacting entities, autonomous and decentralized, are also *mobile*, and in some cases communication might not be explicit. They include for example: software *mobile agents* in communication networks, *mobile sensors* networks, and *robotic swarms*. The realities of these entities are very different: robots and sensors are physical entities which operate in 2D or 3D spaces, while agents are software entities that operate in networked environments. In spite of their differences, some of the key problems and critical issues are very similar, suggesting the presence of common underlying principles. This tutorial will provide an introduction on how computations can be performed by autonomous mobile entities, under what conditions and at what costs, drawing examples from all three settings: mobile agents, autonomous robots, and mobile sensor networks.



Tutorial 2: **Beyond the glamour of Byzantine Fault Tolerance: OR why resisting intrusions means more than BFT**

Paulo Veríssimo (Faculty of Sciences, University of Lisbon)
<http://homepages.di.fc.ul.pt/~pju/pju.html>

Byzantine Fault Tolerance (BFT) has become a reference paradigm for dealing with faults and intrusions, achieving security (and dependability) in an automatic way, much along the lines of classical fault tolerance. However, BFT is a means to an end --- intrusion tolerance and resilience --- and resilience to intrusions means actually more than BFT. The explosive combination of the desired asynchrony of these systems with the real-life (and real-time) power of attackers, has brought about limitations of the paradigm as a basis for designing resilient systems, addressed by several researchers, some of which quite unexpected. Although recent practical algorithmic or systems fixes have partially improved the situation, we show that the problems have a formal root: exhaustion failure and the susceptibility of current BFT systems to it. We give several practical examples of the phenomenon. The tutorial consolidates recent results pointing to the fact that there is more to designing resilient systems than BFT and that, surprisingly or not, not all BFT algorithms lead to resilient designs (resilience meaning the capacity of your system to fulfill its mission to the end in the presence of, perhaps harsh, accidents and attacks, i.e. faults and intrusions). Firstly, we start by discussing the theoretical underpinnings: we propose a system predicate, called exhaustion safety (ES), that should in fact be met by any resilient-to-be BFT algorithm and system; we show impossibility results for ES in asynchronous BFT systems and show that they can be overcome under hybrid distributed systems models; we review recent algorithmic lower bounds that show the power of this latter model. Then, we review recent research results that address a complete approach to designing resilient BFT systems, especially in dynamic and long-lived environments. Concepts like consensus, state machine replication, proactive/reactive recovery/resilience, diversity, distributed systems hybridization, exhaustion safety, are put in context in a coherent whole, giving insight on the correct design of resilient

systems: how to structure a BFT hybrid distributed system; how to design and show the correctness of BFT algorithms under hybrid models; how to actually solve the above-mentioned problems of BFT. Finally, extensive literature pointers are given, namely to works featuring a concern to achieve actual resilience against Byzantine faults. The matters of the tutorial have been presented and perfected over several editions, for example at PhD level courses at U. Roma la Sapienza, Carnegie Mellon, Swiss Romande >PhD Spring School, or recently at the INRIA Winter School on Hot Topics in Distributed Computing. Tutorial elements: General problem definition: prevention vs. tolerance vs. resilience; Specific problem definition: misconceptions and limitations w.r.t. Byzantine Fault Tolerance; Formalisation: exhaustion failure and exhaustion safety; Practical examples of the problems; Solutions: hybrid distributed system models; Validity of the hybrid approach: algorithms, lower bounds, related work.



Tutorial 3: System-level diagnosis: a stroll through 45 years of research on diagnosable systems

Elias P. Duarte Jr. (Federal University of Paraná, Brazil)

<http://www.inf.ufpr.br/elias>

The growing complexity and dependability requirements of hardware, software, and networks demand efficient techniques for discovering disruptive behavior in those systems. System-level diagnosis is a realistic approach to detect faulty units based on the outputs of tests and tasks executed by system units. This tutorial presents an introduction to the vast amount of research efforts that have been produced in this field, from the earliest theoretical models to new promising applications. Relevant diagnosis strategies, including comparison-based diagnosis will be presented described. The tutorial aims at clarifying and uncovering the potential of this technology, which can be applied to improve the dependability of diverse complex computer systems.



Tutorial 4: Implementing concurrent objects in multiprocessor machines

Michel Raynal (University of Rennes, France)

<http://www.irisa.fr/prive/raynal/>

The advent of multicore architectures makes more and more important the design of efficient shared data structures also called concurrent objects. This tutorial is organized in two parts, as follows: Part 1: A Short Introduction to Wait-free Computing. Informally, "wait-free" means that the progress of a process depends only on itself. This notion is more and more pervasive in a lot of problems that basically rely (in one way or another) on the definition and the use of concurrent objects in presence of failures. This lecture will visit wait-free computing: its underlying concepts and its basic mechanisms. To that end, the lecture will also visit fundamental notions of synchronization such as the consensus number notion, and problems of asynchronous computing in presence of failures (such as renaming, set agreement, snapshot, etc.). Part 2: Looking for Efficient

Implementations of Concurrent Objects. A contention-sensitive implementation of a concurrent object is an implementation such that the overhead introduced by locking is eliminated in the common cases, i.e., when there is no contention or when the operations accessing concurrently the object are non-interfering. This talk, that can be considered as an introduction to the topic, will present a methodological construction of a contention-sensitive implementation of a concurrent object. The talk, that will present algorithms in an incremental way, will also visit also a family of liveness conditions and important concurrency-related concepts such as the notion of an abortable object.

SOCIAL EVENTS

Welcome reception

Monday, October 15th, 18:30 – 20:30

Location: Auditorium's foyer – Institute of Mathematics

Conference tour

Wednesday, October 17th, 15:30 – 19:30

Pelourinho and Historic Center (including Cathedral Basilica, Church of São Francisco, and City Museum).

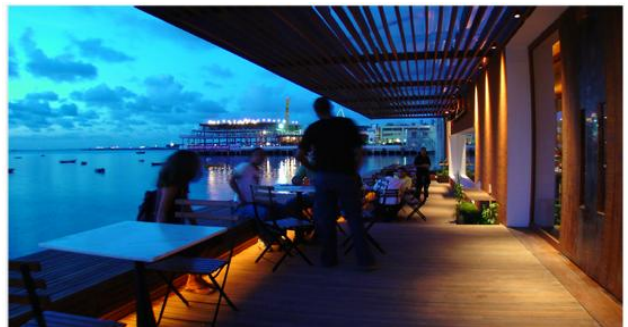


Conference dinner

Wednesday, October 17th, 19:30 – 22:30

Restaurante Amado

<http://www.amadobahia.com.br/>



CONFERENCE COMMITTEES

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Marcos K. Aguilera (chair), Microsoft Research

Lorenzo Alvisi, UT Austin

James Aspnes, Yale

Hagit Attiya, Technion

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Toshimitsu Masuzawa, Osaka U.

Boaz Patt-Shamir, Tel Aviv U.

Andrzej Pelc, U. Quebec

Michel Raynal, IRISA

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Andre Schiper, EPFL

Nir Shavit, MIT and TAU

Neeraj Suri, TU Darmstadt

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Jennifer Welch, Texas A&M

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