CPAIOR 2011
Conference Program

May 23-27
CPAIOR 2011
Zuse Institute
BERLIN
8th International Conference on Integration of Artificial Intelligence and Operations Research
Techniques in Constraint Programming for Combinatorial Optimization Problems

The Venue

The Zuse Institute Berlin (ZIB) is a research institute for applied mathematics and computer science. Our research and service is driven by the principle "Fast Algorithms – Fast Computers": We provide solutions for complex problems in science, engineering, environment, and society – problems that require innovative approaches.

In close cooperation with partners from science, economy, and society we develop mathematical models and efficient algorithms. For the users of our high-performance computers we provide specialized consulting services.

Conference Desk

The conference desk is located in the foyer of ZIB and is open from Monday to Friday, 8:15 to 18:00. You can also reach the conference desk via the conference phone **+49 (30) 84185-238**. After hours this phone number will be forwarded to one of the organizers. In an **emergency case** you can use this number at any time.

Weekly Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00 – 18:00	Master Class	Workshop Day	Conference Day 1	Conference Day 2	Conference Day 3
18:00 – later	Reception	Barbecue	Reception	Dinner	

Internet Access

There is an open **WiFi access** point at ZIB available for all participants. It has the name "**Gast im ZIB**". There will be no WiFi available in the workshop's seminar rooms at FU Berlin.

Further, we provide **LAN cables** in the seminar room at ZIB (Room 2006) which is located in the ground floor next to the main lecture hall. They will be available during the whole conference except for Tuesday.

Coffee Breaks

Each day there is an official coffee break in the morning and one in the afternoon. These include drinks and pastries. Between these two coffee breaks there are drinks available at the ZIB foyer. The coffee breaks take place in the foyer of ZIB next to the conference desk.

Lunch

On all days, participants can have lunch at the "MENSA" (canteen) of FU Berlin.

There are two cashiers for CPAIOR participants. Only at these two points, people with an CPAIOR name badge will not be asked to pay. The cashiers will total up the food such they can finally charge ZIB. Since the MENSA charges less for students, we ask participants with a valid student ID to show it to the cashiers. Hence: **Bring your name badge and student id!**

Social Events

During the conference there are several social events planned.

- ▷ Master Class Reception on Monday takes place in the ZIB foyer.
- ▷ Workshop Barbecue on Tuesday takes place in front of ZIB.
- ▷ Conference Reception on Wednesday is located in the Botanic Garden. See the map on the cover of the conference program. Together, we will leave at ZIB after the conference photo around 18:45.
- ▷ Gala Dinner on Thursday takes place on top of the Berlin TV tower. We leave ZIB at 17:30 by bus. Note that the access to the tower is restricted. Therefore, please ask us for directions if you plan to go there on your own.

Conference Photo

After the talks on Wednesday and before the reception we take the official conference photo in front of ZIB. **Please be there at 18:00.**

Berlin Public Transport

Public transport is the way to travel in Berlin. It operates on frequent schedules (every 3-10 minutes during daytime), it is fast and safe. Find the network map of the subway (U-Bahn) and metro train (S-Bahn) in your conference material. S- and U-Bahn operate from 5 am to midnight during the week and 24 hours on the weekend. Note that there is a corresponding night bus for every U-Bahn.

Most likely, you will exclusively need AB tickets, which cost 2.30 Euros for a single trip, 6.30 Euros for a day, or 27.20 Euros for a week. Only if you are leaving Berlin, e.g., to go to Potsdam or Schönefeld airport, you will need an ABC ticket (3.00 Euros).

Master Class, Monday May 23

Search is fundamental to solving combinatorial optimization problems. But different sub-fields in AI and OR employ different approaches and make different trade-offs in their standard approaches to search. For example, constraint programming search typically spends only a small amount of time at each node before branching and search trees are almost always explored in depth-first order. In contrast, in mixed-integer programming, much more effort is spent at each node and node selection heuristics can guide the exploration away from a depth-first search. Node selection is even more central to standard AI search techniques like A* and its variations.

Given the fundamental nature of search, the Master Class has three goals:

- ▷ to introduce the basics of search in CP, MIP, SAT, and AI
- ▷ to give an overview of the state-of-the-art search techniques in each area
- ▷ to point out and debate points of similarity and difference in each area's approach with the eventual aim of inspiring an understanding of search that spans the areas.

Place

ZIB Lecture Hall (LH) – Room 2005

Schedule

8:15 – 18:00	Registration
8:45 – 9:00	Opening
9:00 – 10:15	Search in Mixed-Integer Linear Programming John Chinneck
10:15 – 10:45	Coffee Break
10:45 – 12:00	(Backtrack) Search in Constraint Programming Gilles Pesant
12:00 – 13:30	Lunch Break
13:30 – 14:45	Search in SAT Marijn Heule
14:45 – 15:15	Coffee Break
15:15 – 16:30	The Deployment of Fast A* Search Nathan Sturtevant
16:30 – 16:45	Stretch Break
16:45 – 18:00	Panel Session: Ideas for Crossfertilization and Hybrids John Chinneck, Gilles Pesant, Marijn Heule, Nathan Sturtevant
18:00 – later	Master Class Reception

Abstracts

Below you find the abstracts of the master class speakers. The slides are available on the CPAIOR web page `http://cpaior2011.zib.de/downloads`.

John Chinneck – Search in Mixed-Integer Linear Programming

Research on methods for solving Mixed-Integer Linear Programs (MIPs) dates to 1956. This long history means that MIP researchers proposed many of the seminal ideas in search that are echoed in other disciplines. At the same time, the Linear Programming (LP) structure inherent in MIP means that some search techniques are peculiar to MIP. The presentation is a tutorial overview of the main ideas relating to search in MIP, along with a summary of more recent ideas and techniques. The two most important topics are node selection and branching variable selection, and the principles motivating the choice of heuristics for each of these.

Gilles Pesant – (Backtrack) Search in Constraint Programming

Constraint Programming originated for the most part from the field of Artificial Intelligence and is thus similarly structured around Representation and Search. The former led to declarative models and powerful inference algorithms encapsulated in each of their constraints. The latter offers programmable search that can be tailored to a specific problem, most often based on backtrack search. Much of the originality and success of Constraint Programming so far has come from the side of inference but there has been growing interest lately in robust generic search heuristics as key to the widespread use of this technology. The presentation is a tutorial overview of the main ideas relating to search in CP (search tree traversal, variable and value selection heuristics) along with a summary of more recent ideas and techniques (e.g. learning during search, impact-based search, counting-based search).

Marijn Heule – Search in SAT

Satisfiability (SAT) solvers have become powerful search engines to solve a wide range of applications in fields such as formal verification, planning and bio-informatics. Due to the elementary representation of SAT problems, many low-level optimizations can be implemented. At the same time, there exist clause-based techniques that can simulate several high-level reasoning methods. The tutorial focuses on the search procedures in successful conflict-driven clause learning SAT solvers. It shows how to learn from conflicts and provides an overview of effective heuristics for variable and value selection. Additionally, the presentation covers recent developments, in particular a technique used in today's strongest solvers: the alternation between "classic" depth-first search with learning, and breadth-first search for simplification.

Nathan Sturtevant – The Deployment of Fast A* Search

Research in heuristic search over the last 25 years has often tended towards domains that grow exponentially, often typified by puzzles such as the sliding tile puzzle or Rubik's cube. But, in the last five years there have been a great number of advancements for search in domains that fit in memory where very fast search is required. This tutorial will begin with the basics of A* search with consistent and inconsistent heuristics, and then cover recent algorithms used for search in road networks and in games, with detailed examples from the game Dragon Age: Origins.

Workshops, Tuesday May 24

CPAIOR workshops aim to provide an opportunity to present and discuss ongoing research in small groups. The workshop program will take place on Tuesday, May 24. This year there are four workshops:

- ▷ Mathematical Optimization for Energy Networks
- ▷ Hybrid Methods for Nonlinear Combinatorial Optimization Problems
- ▷ ISA – Innovative Scheduling and other Applications using CP-AI-OR
- ▷ Mathematical Optimization of Railway-Systems

These workshops take place at ZIB and in the PI building of the FU Berlin. See the map for the location of the PI building and follow the signs.

Below you find an overview of all four workshops followed by a detailed program for each individual workshop.

Overview

	Energy	MINLP	ISA	Railway
8:15 – 18:00	Registration			
9:00 – 10:30	ZIB Seminar Room Room 2006			ZIB Lecture Hall Room 2005
10:30 – 11:00	Coffee Break			
11:00 – 12:30	ZIB Seminar Room Room 2006			ZIB Lecture Hall Room 2005
12:30 – 14:00	Lunch Break			
14:00 – 15:30	ZIB Seminar Room Room 2006	FU Berlin PI Building Room 008	FU Berlin PI Building Room 032	ZIB Lecture Hall Room 2005
15:30 – 16:00	Coffee Break			
16:00 – 18:00	ZIB Seminar Room Room 2006	FU Berlin PI Building Room 008	FU Berlin PI Building Room 032	ZIB Lecture Hall Room 2005
18:10 – 18:45	Guided Supercomputer Tour, starts at ZIB Lecture Hall			
19:00 – later	Workshop Barbecue / Studio da Vinci Tour			

Mathematical Optimization for Energy Networks

Energy networks are the backbone of a reliable supply of gas, oil, and power for industrial and private customers. It is required to safely and efficiently distribute the various sources of energy. Companies involved in this business are interested in methods to set up, manage, maintain, and extend such networks in an economic way. New technology advances (such as smart grids) and new (de-)regulation rules for network operators yield new challanges that have not been addressed before. Recently, contributions from mathematical optimization techniques are in use to solve such tasks.

Organizers

- Armin Fügenschuh, Zuse Institute Berlin, Germany
- Benjamin Hiller, Zuse Institute Berlin, Germany
- Jesco Humpola, Zuse Institute Berlin, Germany
- Thorsten Koch, Zuse Institute Berlin, Germany

Homepage

`http://cpaior2011.zib.de/workshops/energy/`

Place

ZIB Seminar Room (SR) – Room 2006

Schedule

8:15 – 18:00	Registration
9:00 – 9:45	**Invited Talk** Optimal Design and Dimensioning of Hydrogen Transmission Pipeline Network Daniel De Wolf
9:45 – 10:30	**Invited Talk** A Stochastic Mixed Integer Model for Natural Gas Infrastructure Investments Asgeir Tomasgard
10:30 – 11:00	Coffee Break
11:00 – 11:30	Nonconvex Generalized Benders Decomposition for Natural Gas Production Network Design and Operation Under Uncertainty Xiang Li
11:30 – 12:00	An Integer Linear Programming Approach to AC Power Grid Design Stephan Lemkens
12:00 – 12:30	Capacity Planning in Energy Networks by Probabilistic Programming Andris Möller
12:30 – 14:00	Lunch Break
14:00 – 14:30	Valuation of Pumped-Storage Power Plants under Uncertainty based on a Real-Option Approach Ed Zuur, Max Scheidt
14:30 – 15:00	Forecasting Gas Flow on Exits of Gas Transmission Networks Radoslava Mirkov
15:00 – 15:30	MPCC Models and Primal Heuristics for MINLP in Gas Networks Marc Steinbach
15:30 – 16:00	Coffee Break
16:00 – 16:30	Checking Feasibility in Stationary Models of Gas Transportation Claudia Stangl
16:30 – 17:00	Topology Planning of Gas Transportation Networks by Solving MINLPs (Part I) Robert Schwarz
17:00 – 17:30	Topology Planning of Gas Transportation Networks by Solving MINLPs (Part II) Jesco Humpola
17:30 – 18:00	Gas Network Optimization Uwe Gotzes
18:10 – 18:45	Guided Supercomputer Tour, starts at ZIB Lecture Hall
19:00 – later	Workshop Barbecue / Studio da Vinci Tour

Hybrid Methods for Nonlinear Combinatorial Optimization Problems

This workshop aims at bringing together scholars and practitioners from the Mixed Integer Nonlinear Programming (MINLP) and the Constraint Programming (CP) community to share their thoughts on the theory and implementation of solvers for MINLP and CP problems. This workshop is motivated by the recent development of new solvers and exciting new results in MINLP and CP.

Organizers

- ▷ Stefano Gualandi, Universita di Pavia, Italy
- ▷ Pietro Belotti, Clemson University, USA

Homepage

`https://sites.google.com/site/hybridnl2011/`

Place

FU Berlin PI building – Room 008 (see map on the cover)

Schedule

8:15 – 18:00	Registration
12:30 – 14:00	Lunch Break
14:00 – 14:30	A graph structure to encode bound implications in MINLP Giacomo Nannicini
14:30 – 15:00	Is the Solution of Nonconvex MINLP Problems More Expensive than the Solution of Continuous NLP Problems? Oliver Exler
15:00 – 15:30	An Exact Algorithm for a Specific Binary Quadratic Optimization Problem Bernhard Stöcker
15:30 – 16:00	Coffee Break
16:00 – 16:45	**Invited Talk** Distance constraints in Euclidean geometry Leo Liberti
17:00 – 17:30	Optimizing the Conditional Value-at-Risk for Production Planning with Risky Revenue Ban Kawas
17:30 – 18:00	Towards global optimization of combined distillation-crystallization processes for the separation of closely boiling mixtures Martin Ballerstein
18:10 – 18:45	Guided Supercomputer Tour, starts at ZIB Lecture Hall
19:00 – later	Workshop Barbecue / Studio da Vinci Tour

ISA – Innovative Scheduling and other Applications using CP-AI-OR

In the focus of this workshop are any new innovative applications using CP-AI-OR technology either addressing new application areas, the combination of different modeling and/or solution technologies (hybrid problem models, hybrid solvers, problem decomposition, new modeling concepts and pruning/search algorithms) or interactive systems assisting their users in decision making.

The workshop provides the opportunity to present and discuss ongoing research and prototype systems showing the potential of CP-AI-OR concepts, models and algorithms in applications areas which are open for any innovative management solutions. Due to this fact, the topics addressed in this workshop are of great interest for CP-AI-OR.

Organizers

- ▷ Armin Wolf, Fraunhofer-Institut für Rechnerarchitektur und Softwaretechnik, FIRST, Berlin, Germany
- ▷ Petra Hofstedt, Brandenburgische Technische Universität Cottbus, Germany

Homepage

`http://www.constraint-programming.de/ISA-CPAIOR-2011`

Place

FU Berlin PI building – Room 032 (see map on the cover)

Schedule

8:15 – 18:00	Registration
12:30 – 14:00	Lunch Break
14:00 – 14:05	Welcome
14:05 – 15:00	**Invited Talk** A bit of CP, a bit of AI, a bit of OR and a bit of coding Petr Vilím
15:00 – 15:30	Constraint-based crew scheduling for public transport Michael Marte and Valentin Mayer-Eichberger
15:30 – 16:00	Coffee Break
16:00 – 16:30	Description of a Practical, Benders' Cut Inspired VRP System Anna Prenzel and Georg Ringwelski
16:30 – 17:00	Using constraint propagation to improve the usability of an intelligent decision support system Steve Dillan and Georg Ringwelski
17:00 – 17:30	Towards a Constraint-Based Load Balancing in E-Mobility Armin Wolf
17:30 – 18:00	Discussion and Closing
18:10 – 18:45	Guided Supercomputer Tour, starts at ZIB Lecture Hall
19:00 – later	Workshop Barbecue / Studio da Vinci Tour

Mathematical Optimization of Railway-Systems

The focus of this workshop is on solution techniques for combinatorial optimization problems, which arise in railway systems. The main motivation for this workshop is the observation that railway planning problems can be extremely difficult to solve optimally with existing methods, while doing so could result in huge gains, e.g., in terms of cost reductions or service quality improvements.

Organizers

- Ralf Borndörfer, Zuse Institute Berlin, Germany
- Holger Flier, ETH Zürich, Switzerland
- Martin Fuchsberger, ETH Zürich, Switzerland
- Thomas Schlechte, Zuse Institute Berlin, Germany

Homepage

`http://cpaior2011.zib.de/workshops/railway/`

Place

ZIB Lecture Hall (LH) – Room 2005

Schedule

8:15 – 18:00	Registration
9:00 – 10:00	**Invited Talk** OR in Passenger Railways – On the Move towards Real-time Rescheduling G. Maroti
10:00 – 10:30	Optimization of dispatching decisions F. Weymann
10:30 – 11:00	Coffee Break
11:00 – 11:30	Vehicle Rotation Planning for Intercity Railways R. Borndörfer, M. Reuther , T. Schlechte, S. Weider
11:30 – 12:00	Regularity in Rolling Stock Roster Planning R. Borndörfer, O. Heismann
12:00 – 12:30	Models for Hump Yard Track Allocation with Temporary Car Storage M. Bohlin , H. Flier, J. Maue, M. Mihalak
12:30 – 14:00	Lunch Break
14:00 – 14:30	A Parallel Bundle Method for Asynchronous Subspace Optimization in Lagrangian Decomposition and its Application to Train Timetabling Problems F. Fischer , C. Helmberg
14:30 – 15:00	A Modified Shifting Bottleneck Procedure for Train Scheduling in the UK B. Khosravi , J.A. Bennell, C.N. Potts
15:00 – 15:30	Freight Train Routing R. Borndörfer, A. Fügenschuh, T. Klug , T. Schlechte
15:30 – 16:00	Coffee Break
16:00 – 16:30	Planning the Expansion of Railway Networks to deal with future Demands A. Bärmann, A. Martin, S. Pokutta
16:30 – 17:00	Scenario-Scaping with inverse programming for intermodal transportation C. Burt, J. Puchinger
17:00 – 17:30	Speedup-Techniques for Multi-Criteria Timetable Information Systems D. Mäurer, M. Schnee
18:10 – 18:45	Guided Supercomputer Tour, starts at ZIB Lecture Hall
19:00 – later	Workshop Barbecue / Studio da Vinci Tour

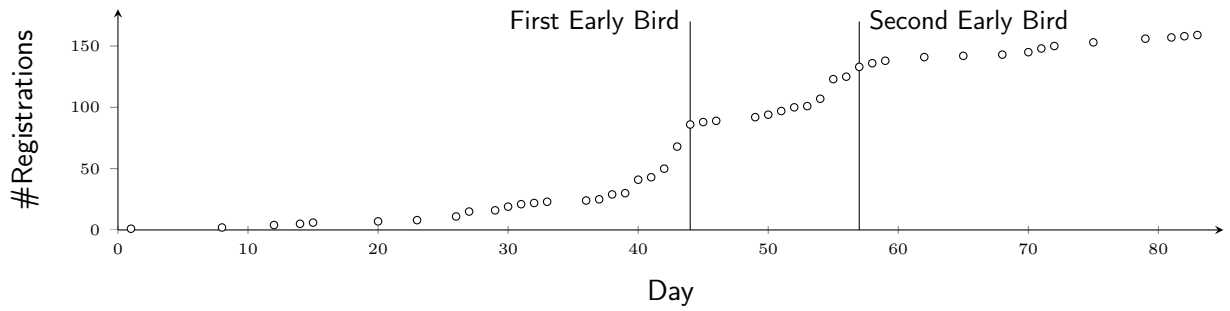
Conference, May 25 – 27

The aim of the conference is to bring together interested researchers from constraint programming (CP), artificial intelligence (AI) and operations research (OR) to present new techniques or applications in the intersection of these fields and to provide an opportunity for researchers in one area to learn about techniques in the others. A main objective of this conference series is also to give these researchers the opportunity to show how the integration of techniques from different fields can lead to interesting results on large and complex problems. Therefore papers that actively combine, integrate, or contrast approaches from more than one of the areas are especially solicited. High quality papers from a single area are also welcome. Finally, application papers showcasing CP/AI/OR techniques on innovative and challenging applications or experience reports on such applications are strongly encouraged.

After a successful series of five CPAIOR international workshops in Ferrara (Italy), Paderborn (Germany), Ashford (United Kingdom), Le Croisic (France), and Montreal (Canada), in 2004 CPAIOR evolved into a conference. More than 100 participants attended the first meeting held in Nice (France). In the subsequent years, CPAIOR was held in Prague (Czech Republic), Cork (Ireland), Brussels (Belgium), Paris (France), Pittsburgh (USA) and Bologna (Italy). See also the official webpage of the CPAIOR Conference Series: `http://www.andrew.cmu.edu/user/vanhoeve/cpaior/`

This year we have more than 150 participants from 19 countries located on 4 continents. One third of the participants are students. The country distribution and the timeline of registrations as of May 16 are as follows:

Country	Germany	USA	France	Switzerland	Canada	Australia	Belgium	Italy	Denmark	Austria	The Netherlands	UK	Ireland	Japan	Turkey	Brazil	Czech Republic	Norway	Sweden
Participants	79	17	10	9	7	6	5	5	4	3	3	3	2	2	2	1	1	1	1



Proceedings

The conference proceedings are available online. Visit `http://cpaior2011.zib.de/proceedings`. Username and password can be found in the printed version of this program.

Conference Chairs

- ▷ Timo Berthold, Zuse Institute Berlin, Germany
- ▷ Ambros M. Gleixner, Zuse Institute Berlin, Germany
- ▷ Stefan Heinz, Zuse Institute Berlin, Germany
- ▷ Thorsten Koch, Zuse Institute Berlin, Germany

Program Chairs

- ▷ Tobias Achterberg, IBM, Germany
- ▷ J. Christopher Beck, University of Toronto, Canada

Place

ZIB Lecture Hall (LH) – Room 2005

Overview

	Wednesday	Thursday	Friday
8:15 – 9:00	Opening	Opening	Opening
9:00 – 10:30	Invited Talk	Invited Talk	Invited Talk
10:00 – 10:30	Coffee Break	Coffee Break	Coffee Break
10:30 – 12:25	Paper Presentation	Paper Presentation	Paper Presentation
12:25 – 13:50	Lunch Break	Lunch Break	Lunch Break
13:50 – 14:00	Future Conference CP 2011	Future Conferences CPAIOR 2012	Future Conferences ISMP 2012
14:00 – 15:30	Paper Presentation	Paper Presentation	Paper Presentation
15:30 – 15:45	Coffee Break	Coffee Break	Closing Remarks
15:45 – 16:00			Coffee Break
16:00 – 16:30	Paper Presentation	Paper Presentation	
16:30 – 17:00			(Informal) Visit to the Ethnological Museum
17:30 – 18:00		Sightseeing bus tour to Alexanderplatz	
18:00 – 18:30			
18:30 – 19:00	**Conference Photo at ZIB**		
19:00 – later	Reception in the Botanic Garden	Gala Dinner on top of the Berlin TV Tower	(Informal) Farewell at a Beergarden

Conference Day 1, Wednesday May 25

8:15 – 18:00	Registration
8:45 – 9:00	Opening
9:00 – 10:00	**Invited Talk** Session Chair: Chris Beck
	Preference Elicitation and Preference Learning in Social Choice Craig Boutilier, University of Toronto, Canada
10:00 – 10:30	Coffee Break
10:30 – 12:25	**Scheduling** Session Chair: Alkis Vazacopoulos
	Long Paper Climbing Depth-bounded Adjacent Discrepancy Search for Solving Hybrid Flow Shop Scheduling Problems with Multiprocessor Tasks Asma Lahimer, Pierre Lopez and Mohamed Haouari
	Short Paper Parallel Machine Scheduling with Additional Resources: A Lagrangian-based Constraint Programming Approach Emrah B. Edis and Ceyda Oguz
	Long Paper Precedence Constraint Posting for Cyclic Scheduling Problems Alessio Bonfietti, Michele Lombardi, Michela Milano and Luca Benini
	Abstract Solving the no-wait job shop problem: an ILP and CP approach Henno Vermeulen, Han Hoogeveen and Marjan Van Den Akker
	Abstract Comparing Integer Programming and Constraint Programming for a Flow Shop Lot Streaming Problem Rahime Sancar Edis, Ceyda Oguz and Emrah B. Edis
12:25 – 13:50	Lunch Break
13:50 – 14:00	**Future Conference** – CP 2011
14:00 – 15:30	**Optimization on Graphs** Session Chair: Helmut Simonis
	Long Paper Optimization Methods for the Partner Units Problem Conrad Drescher, Markus Aschinger, Gerhard Friedrich, Georg Gottlob, Peter Jeavons, Anna Ryabokon and Evgenij Thorstensen
	Long Paper Branch-Cut-and-Propagate for the Maximum k-Colorable Subgraph Problem with Symmetry Tim Januschowski and Marc E. Pfetsch
	Abstract Using column generation to solve the edge coloring problem Han Hoogeveen, Marjan Van Den Akker and Wouter Lauret
	Abstract Three ideas for the Quadratic Assignment Problem Matteo Fischetti, Michele Monaci and Domenico Salvagnin

15:30 – 16:00	Coffee Break
16:00 – 17:10	**Core Solver Technologies** Session Chair: Robert Fourer
	Long Paper Manipulating MDD Relaxations for Combinatorial Optimization David Bergman, Willem-Jan van Hoeve and John Hooker
	Short Paper On counting lattice points and Chvatal-Gomory cutting planes Andrea Lodi, Gilles Pesant and Louis-Martin Rousseau
	Abstract Which Mixed Integer Programs could a million CPUs solve? Thorsten Koch and Yuji Shinano
17:10 – 17:20	Stretch Break
17:20 – 18:30	**Rostering** Session Chair: Pierre Schaus
	Short Paper Identifying Patterns in Sequences of Variables Alessandro Zanarini and Pascal van Hentenryck
	Short Paper Retail Store Workforce Scheduling by Expected Operating Income Maximization Nicolas Chapados, Marc Joliveau and Louis-Martin Rousseau
	Abstract Exact Branch-and-price for Fair-share Airline Crew Rostering Ranga Muhandiramge
18:30 – 18:45	**Conference Photo at ZIB**
18:45 – later	Conference Reception in the Botanic Garden

Conference Reception

The Conference Reception is located in the Botanic Garden. See the map on the cover of the conference program. Together, we will leave from ZIB after the conference photo around 18:45.

Conference Day 2, Thursday May 26

8:15 – 18:00	Registration
9:00 – 10:00	**Invited Talk** Session Chair: Mark Wallace
	Propagation in Constraints: How One Thing Leads To Another Ian Gent, St. Andrews University, Scotland
10:00 – 10:30	Coffee Break
10:30 – 12:25	**Networks and Transportation** Session Chair: Louis-Martin Rousseau
	Long Paper Spatial and Objective Decompositions for Very Large SCAPs Carleton Coffrin, Pascal van Hentenryck and Russell Bent
	Short Paper Efficient Planning of Substation Automation System Cables Thanikesavan Sivanthi and Jan Poland
	Long Paper Upgrading Shortest Paths in Networks Bistra Dilkina, Katherine Lai and Carla Gomes
	Abstract Multimodal Home Healthcare Scheduling using a novel CP-VND-DP Approach Andrea Rendl, Matthias Prandtstetter and Jakob Puchinger
	Abstract Benders Decomposition for the Full-Truckload Pickup-and-Delivery Vehicle Routing Problem Jenny Nossack and Erwin Pesch
12:25 – 13:50	Lunch Break
13:50 – 14:00	**Future Conference** – CPAIOR 2012
14:00 – 15:30	**Learning, Feasibility, and Scheduling** Session Chair: Willem-Jan van Hoeve
	Long Paper A probing algorithm for MINLP with failure detection by SVM Giacomo Nannicini, Pietro Belotti, Jon Lee, Jeff Linderoth, Francois Margot and Andreas Waechter
	Long Paper A new algorithm for linear and integer feasibility in Horn constraints K. Subramani and James Worthington
	Abstract Learning Graphical Models for Algorithm Configuration Mauro Birattari, Marco Chiarandini, Marco Saerens and Thomas Stuetzle
	Abstract Satisfiability Test for the Energy Constraint Christian Artigues, Pierre Lopez and William Mangoua Sofack

15:30 – 16:00	Coffee Break
16:00 – 17:10	**Search in CP** Session Chair: Laurent Perron
	Short Paper Recovering Indirect Solution Densities for Counting-Based Branching Heuristics Gilles Pesant and Alessandro Zanarini
	Abstract Towards a Characterization of Adaptiveness for Constraint Programming Search Design Thiago Serra
	Abstract Search Combinators Tom Schrijvers, Guido Tack, Pieter Wuille, Horst Samulowitz and Peter Stuckey
17:10 – 17:30	
17:30 – 19:00	Sightseeing bus tour to Alexanderplatz
19:00 – 19:30	
19:30 – later	Gala Dinner on top of the Berlin TV tower

Gala Dinner

Gala Dinner takes place on top of the Berlin TV tower. We leave ZIB at 17:30 by busses. Note that the access to the tower is restricted. Therefore, please ask us for directions if you plan to go there on your own.

Getting Home

The TV tower closes at midnight. S- and U-Bahn operate until midnight, but not much longer. If you plan to go home later, you will have to use night busses (besides others, each U-Bahn line has a corresponding night bus line) or stop/call a taxi (e.g., **+49 (30) 261026** or **0800 0261026**). A taxi from the TV tower to ZIB, e.g., will cost 20 to 25 Euros.

Conference Day 3, Friday May 27

8:45 – 12:00	Registration
9:00 – 10:00	**Invited Talk** Session Chair: Tobias Achterberg
	On Bilevel Programming and its Impact in Branching, Cutting and Complexity Andrea Lodi, DEIS, University of Bologna, Italy
10:00 – 10:30	Coffee Break
10:30 – 12:25	**Global Constraints and CP Modeling** Session Chair: Michel Rueher
	Long Paper The AllDifferent Constraint with Precedences Christian Bessiere, Nina Narodytska, Claude-Guy Quimper and Toby Walsh
	Short Paper The objective sum constraint Jean-Charles Regin and Thierry Petit
	Long Paper Using hard constraints for representing soft constraints Jean-Charles Regin
	Abstract Neuron Constraints to Model Complex Real-World Problems Michele Lombardi and Michela Milano
	Abstract The Aimms Interface to Constraint Programming Willem-Jan van Hoeve, Marcel Hunting and Chris Kuip
12:25 – 13:50	Lunch Break
13:50 – 14:00	**Future Conference** – ISMP 2012
14:00 – 15:30	**Global Contraints for Scheduling** Session Chair: Michele Lombardi
	Long Paper Timetable Edge Finding Filtering Algorithm for Discrete Cumulative Resources Petr Vilím
	Long Paper Almost Square Packing Helmut Simonis and Barry O'Sullivan
	Abstract Explanation Algorithms for Cumulative Scheduling Stefan Heinz and Jens Schulz
	Abstract A Constraint Programming Approach for a Batch Processing Problem with Non-identical Job Sizes Arnaud Malapert, Louis-Martin Rousseau and Christelle Guéret
15:30 – 15:45	Closing Remarks Martin Grötschel, Vice President Zuse Institute Berlin
15:45 – 16:00	Coffee Break
16:00 – 16:30	
16:30 – 18:00	(Informal) Visit to the Ethnological Museum
18:00 – later	(Informal) Farewell at a Beergarden

Sponsors

CPAIOR 2011 is held with the generous support of many sponsors:

DFG Research Center Matheon

MATHEON develops mathematics for key technologies and supports partners in industry, economy and science. We also cooperate with schools and the general public. Founded in 2002, MATHEON is a joint initiative of the three Berlin universities (FU, HU and TU) and the mathematical research centers (WIAS and ZIB).

Zuse Institute Berlin

The Zuse Institute Berlin (ZIB) is a research institute for applied mathematics and computer science. Our research and service is driven by the principle "Fast Algorithms – Fast Computers": We provide solutions for complex problems in science, engineering, environment, and society – problems that require innovative approaches. In close cooperation with partners from science, economy, and society we develop mathematical models and efficient algorithms. For the users of our high-performance computers we provide specialized consulting services.

Association for Constraint Programming

The Association for Constraint Programming aims at promoting constraint programming in every aspect of the scientific world, by encouraging its theoretical and practical developments, its teaching in the academic institutions, its adoption in the industrial world, and its use in the application fields. The ACP is a non-profit association, which uses the profit of the organized events to support future events or activities. At any given time, members of the ACP are all attendees of a CP conference in the past five years, and all members of the program committee of the current CP conference.

SAS

SAS is the leader in business analytics software and services, and the largest independent vendor in the business intelligence market. Through innovative solutions delivered within an integrated framework, SAS helps customers at more than 50,000 sites improve performance and deliver value by making better decisions faster. Since 1976 SAS has been giving customers around the world THE POWER TO KNOW®.

AIMMS

AIMMS is an advanced development environment for building optimization based operations research applications and advanced planning systems. AIMMS distinguishes itself from other optimization

software by a number of advanced modeling concepts, as well as a full graphical user interface both for developers and end-users. Commercial and open source solvers are available for all major mathematical programming types (CP will become available in 2011). Even uncertainty can be modeled through the concepts of Scenario Analysis, Stochastic Programming and Robust Optimization. Mastering AIMMS is straightforward since the mathematical modeling language concepts will be intuitive to Operations Research professionals and the point-and-click graphical interface is easy to use. The AIMMS optimization software comes with comprehensive documentation, available electronically and in book form. AIMMS is free for Academic use (`http://www.aimms.com/edu`).

Gurobi Optimization

Gurobi Optimization is in the business of providing robust, high-performance optimization software based upon the latest technologies for linear, quadratic and mixed-integer programming. The computational progress in linear, quadratic and mixed-integer programming over the last twenty years has been nothing short of remarkable, enabling business, scientific and other applications that literally would have been unapproachable just a few short years ago. The Gurobi founders have been at the forefront of these developments. The Gurobi suite of optimization products represent completely new implementations, redesigned from the ground up to fully exploit the latest mathematical and "engineering" improvements in the underlying methodologies, as well as developments in modern desktop computing hardware and programming environments; moreover, the Gurobi team is committed not just to providing the best technology now available, but to continuing to push forward the frontier of optimization solution capability.

IBM

FICO

FICO (NYSE:FICO) is a leader in Decision Management, transforming business by making every decision count. FICO uses predictive analytics to help businesses automate, improve and connect decisions across organizational silos and customer lifecycles. Clients in 80 countries work with FICO to increase customer loyalty and profitability, cut fraud losses, manage credit risk, meet regulatory and competitive demands, and rapidly build market share. Most leading banks and credit card issuers rely on FICO solutions, as do insurers, retailers, health care organizations and other companies. FICO works with more than 5,000 businesses worldwide, and our technology serves thousands more through our partnerships. FICO serves global markets through offices in 12 countries. The German office opened in Munich in April 2010. (`http://www.fico.com`)

ICS

The Institute for Computational Sustainability (ICS), founded in 2008 with support from an Expeditions in Computing grant from the National Science Foundation (USA), advances research in the emerging field of Computational Sustainability. The vision of the institute is that computer scientists can – and should – play a key role in increasing the efficiency and effectiveness in the way we manage and allocate our natural resources, while enriching and transforming Computer Science and related fields. The institute is a joint venture involving scientists from Cornell University, Bowdoin College, the Conservation Fund, Howard University, Oregon State University, and the Pacific Northwest National Laboratory.

GAMS

The General Algebraic Modeling System (GAMS) is a high-level modeling system for mathematical programming and optimization. It consists of a language compiler and a stable of integrated high-

performance solvers. GAMS is tailored for complex, large scale modeling applications, and allows you to build large maintainable models that can be adapted quickly to new situations.

IVU Traffic Technologies AG

IVU Traffic Technologies AG has been working for more than thirty years with some 300 software engineers to ensure that transport in the world's major cities operates reliably and on time. People and vehicles in expanding cities are continually on the move – a logistical challenge which calls for intelligent and reliable software systems. The standardised software products of the IVU.suite and tailor-made IT solutions are used to plan, optimise and control the scheduling of vehicle fleets and personnel. Other systems support the choice of branch locations or ensure that election results are determined correctly. IVU. Systems for vibrant cities.

MOSEK

The MOSEK Optimization Software is designed to solve large-scale mathematical optimization problems. MOSEK provides specialized solvers for linear programming, mixed integer programming and many types of nonlinear convex optimization problems.

NICTA

NICTA (National ICT Australia) is Australia's Information and Communications Technology (ICT) Centre of Excellence. We are an independent company in the business of research, commercialisation and research training. With over 700 people, NICTA is the largest organisation in Australia dedicated to ICT research.

Open Grid Europe

With 75 years' experience in the gas business, we operate one of the most efficient gas transmission systems in Europe. Today this pipeline network covers some 12,000 km. It is well developed and being continually extended. An infrastructure which is tailor-made to our customers' requirements and guarantees them a transportation service they can really rely on.

Jeppesen

For over 75 years, we have been helping aviation professionals worldwide reach their destinations safely and efficiently. Today, we build on those roots by offering an ever-expanding array of innovative informational products, services, and software to a growing lineup of air, sea and land transportation partners. For companies such as American Airlines, Lufthansa, Delta, Qantas, British Airways and Deutsche Bahn, we develop resource optimization solutions like flight-planning and complete crew and fleet management systems.

The ABB Group

ABB (`http://www.abb.com`) is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 117,000 people.

atesio

atesio GmbH is highly specialized in planning and optimization telecommunications networks based on mathematical modeling and optimization. atesio develops custom-made software for the telecommunications industry that allows performing large-scale and/or complex analysis and planning tasks. atesio's consulting activities range from operational 2G and 3G network optimization over large-scale network design to strategic decision support by means of techno-economical analyses of alternative network evolution paths.

AMPL

AMPL Optimization develops and supports the AMPL modeling language, an especially powerful and natural tool for developing and deploying the complex optimization problems that arise in diverse business and scientific applications. AMPL is notable for its convenient support of extended problem formulations and advanced algorithmic features. It incorporates an interface to spreadsheet and database files and an integrated scripting language for building iterative optimization schemes. AMPL Optimization also supports and distributes a variety of large-scale solvers for diverse problem types.

ProCom

ProCom GmbH has been providing solutions for planning tasks in the energy industry since 1995. More than 75 employees, thereof over 50 specialists in the planning of energy generation and energy trade, develop software solutions on the basis of the BoFiT IT platform, with which business processes of the energy industry become more transparent and more effectively organised. Clients of the energy industry use ProCom solutions in order to make the right decisions quickly, confidently and reliably. More than 70 solutions are being used by renowned European clients and even the majority of the combined heat and power in Germany is planned with BoFiT today. ProCom pursues a distinct growth and internationalisation strategy.

Notes

P	Parking		Pharmacy	ZIB	Main Lecture Hall (ZIB)	Food:	A FU Mensa
H	Bus Stop		Post Office	PI	Alt. Lecture Hall (Pi building)		B Fabecks
101	Bus Line		ATM	Rec	Reception (Botanic Garden)		C Louise
U3	Subway		Grocery Store	Mus	Museum		D Plaggio
					Entrance		E Alter Krug