MFPS XXXIII

33rd Conference on the Mathematical Foundations of Programming Semantics

CALCO 2017

7th Conference on Algebra and Coalgebra in Computer Science

12–16 June 2017
Faculty of Mathematics and Physics
University of Ljubljana
About the conferences

Mathematical Foundations of Programming Semantics XXXIII
The conference is dedicated to the areas of mathematics, logic, and computer science that are related to models of computation in general, and to semantics of programming languages in particular.

7th Conference on Algebra and Coalgebra in Computer Science
The conference aims to bring together researchers and practitioners with interests in foundational aspects, and both traditional and emerging uses of algebra and coalgebra in computer science.

Practical information

How do I connect to the internet?
The eduroam network is available throughout the building. Alternatively, you may use the local Wi-Fi network MFPSCALCO, which is available in rooms 2.01 and 2.05. The password is whycombinator.

Where do I get even more coffee?
In our Maľja science café on the ground level of the mathematics building.

Where do I get even more water?
Tap water in Ljubljana is of good quality, probably better than bottled water.

Where do I discuss even more science?
The lecture rooms 2.03 and 2.04 are available for discussion.

Where do I get even more help?
- Emergency: 112
- Andrej Bauer: +386 31 727 708
- Matija Pretnar: +386 31 893 497
Local transportation

The conference will take place at the Faculty of Mathematics and Physics, Jadranska 21, second floor. Please consult the map at goo.gl/s0Th0X for further information.

Walking

Most places in Ljubljana can be reached on foot. It takes about 30 minutes to walk from the far end of the city centre to the Faculty. We recommend that you avoid the busy Tržaška cesta and walk down the parallel Jamova cesta, past the ancient Roman wall of Emona.

City bus

To use the buses you need the Urbana paycard, which you can buy and recharge at any newsstand and in many stores. The card costs €2 and one ride €1.20. The entrance to the bus is only at the front. Bus route 1 in the direction of “Mestni log” will take you directly to the venue, which is at the “Jadranska” stop. Alternatively, you can take route 6 in the direction of “Dolgi most” and get off at the “Hajdrihova” stop. Please consult Google maps for further information about bus routes and schedules.

City bicycles

There is a popular city bike service with many bike stations throughout the city. The station closest to the venue is at Tržaška cesta 37. In order to use the bikes, you must pre-register at en.bicikelj.si and buy an Urbana card (see above). The registration fee for one week is just €1, and renting a bike is free for the first hour, which suffices for most rides.

Taxi

Compared to many other cities, taxi service in Ljubljana is relatively cheap. A ride across town will cost anywhere between €4 and €10. Ordering a taxi by phone is somewhat cheaper than picking one up in the street. We have had good experience with Taxi Rondo, reachable at +386 40970970.

Transport from and to the airport

The taxis waiting at the airport are expensive. We strongly recommend that you pre-order a taxi or a shuttle ahead of time and have them wait for you. We have had good experience with Taxi Rondo, reachable 24 hours a day in English at +386 40970970 or at en.taxi-rondo.si. The taxi should cost around €25 and a shuttle around €10.
Lunch

In the vicinity of the venue there are several places where you can have lunch. They are listed by proximity to the venue (marked * on the map):

1. “Maϕja science café” at the venue (0 m)
2. “IJŠ cafeteria” across the street (50 m)
3. “Lonček kuhaj” cafeteria serving home-style food (100 m)
4. “Restaurant Grm” at Hajdrihova 16, Slovenian restaurant (150 m)
5. “Za pumpo” at Tržaška 46, restaurant and pizzeria (500 m)
6. “Rožna hiša” at Rožna dolina c. II/3, Slovenian restaurant (800 m)
7. “Mirje” at Tržaška 5, Italian bistro (1.1 km)

Online map at goo.gl/sOTh0X
Social events

MFPS Welcome reception – Monday June 12 at 18:30

There will be a welcome reception for all MFPS participants after the last talk on Monday. The reception will take place at the venue, outside the Maϕja science café on the ground floor.

Guided tour of Ljubljana – Wednesday June 14 at 18:00

After the last talk on Wednesday we will walk to Trg francoske revolucije with a tourist guide. At 18:00 there we will pick up any remaining participants at the obelisk and continue the tour of the city. The tour will end at the Ljubljana castle where the conference dinner will be served.

Conference dinner – Wednesday June 14 at 20:00

The conference dinner will take place at Gostilna na Gradu, which is in the Ljubljana castle. If you join the guided city tour you will end up there. If you plan to arrive by yourself, you may either walk up to the castle, or take the funicular at Krekov trg 4. Use the magic word “MFPSCALCO” to get a free return pass! Please note that the funicular stops operating at 23:00.
MFPS – Monday, June 12th

8:30–9:00  Registration & Opening  
*in front of room 2.05*

**Tutorial on Advances in Concurrent Program Verification** (room 2.05)

9:00–10:00 Derek Dreyer  
*Iris: A Modular Foundation for Higher-Order Concurrent Separation Logic*

**COFFEE BREAK** (30 minutes)

**Special session on Advances in Concurrent Program Verification** (room 2.05)

10:30–11:05 Robbert Krebbers  
*Interactive Proofs in Higher-Order Concurrent Separation Logic*

11:10–11:45 Jacques-Henri Jourdan  
*RustBelt: Securing the Foundations of the Rust Programming Language*

11:50–12:25 Mike Dodds  
*Starling: Lightweight Concurrency Verification with Views*

**LUNCH BREAK** (1 hour 30 minutes)

**Invited talk** (room 2.05)

14:00–15:00 Laura Kovacs  
*Algebraic Reasoning for Program Analysis*

**COFFEE BREAK** (30 minutes)

**Afternoon session** (room 2.05)

15:30–15:50 Simon Docherty and David Pym  
*A Stone-type duality theorem for Separation Logic via its underlying bunched logics*

15:55–16:15 Aleš Bizjak and Lars Birkedal  
*On Models of Higher-Order Separation Logic*

16:20–16:40 Paul-André Melliès and Léo Stefanesco  
*A Game Semantics of Concurrent Separation Logic*

16:45–17:05 Ryan Kavanagh and Stephen Brookes  
*A Denotational Semantics for SPARC TSO*

**SHORT BREAK** (20 minutes)

17:30–19:00  Welcome Reception  
*outside the Maoja science café at ground floor of the venue*
REPAS meeting – Tuesday, June 13th

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<th>Speaker</th>
<th>Title</th>
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<td>9:00–9:20</td>
<td>Catuscia Palamidessi</td>
<td>Opening of the meeting</td>
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<td>9:20–10:00</td>
<td>Francesco Gavazzo</td>
<td>An Abstract Account to Applicative Bisimulation Metrics</td>
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<td><strong>COFFEE BREAK</strong> (30 minutes)</td>
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<td>10:30–11:05</td>
<td>Prakash Panangaden</td>
<td>Bicategories of Markov Processes</td>
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<td>11:10–11:45</td>
<td>Barbara König</td>
<td>Behavioural Metrics via Functor Lifting – A Coalgebraic Approach</td>
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<td>11:50–12:45</td>
<td>Daniela Petrisan</td>
<td>Is the Kantorovitch lifting canonical?</td>
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<td><strong>LUNCH BREAK</strong> (1 hour 30 minutes)</td>
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<td>14:20–15:00</td>
<td>Raphaëlle Crubillé</td>
<td>Toward Higher-order Cryptography</td>
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<td><strong>COFFEE BREAK</strong> (30 minutes)</td>
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<td>15:30–16:05</td>
<td>Bart Jacobs</td>
<td>Disintegration</td>
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<td>16:10–16:45</td>
<td>Giorgio Bacci</td>
<td>On the Metric-based Approximate Minimization of Markov Chains</td>
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<td>16:50–18:30</td>
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<td><strong>BUSINESS MEETING</strong></td>
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<td><em>in room 2.01</em></td>
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MFPS – Tuesday, June 13th

**Tutorial on Foundations of Network Programming** (room 2.05)

9:00–10:00 Nate Foster  
*Foundations of Network Programming*

**COFFEE BREAK** (30 minutes)

**Special session on Foundations of Network Programming** (room 2.05)

10:30–11:05 Martin Vechev  
*Programmable Networks with Synthesis*

11:10–11:45 Loris D’Antoni  
*Synthesis for intent-based networking*

11:50–12:25 Zack Tatlock  
*Taking the Bull by the Horns: Towards Full Formal Verification for BGP, Raft, and Chord*

**LUNCH BREAK** (1 hour 30 minutes)

**Tutorial on Algebraic Automata Theory** (room 2.05)

14:00–15:00 Laure Daviaud  
*An introduction to the algebraic theory of rational languages (and a little bit of topology)*

**COFFEE BREAK** (30 minutes)

**Special session on Algebraic Automata Theory** (room 2.05)

15:30–16:05 Stefan Milius  
*Eilenberg Theorems for Free*

16:10–16:45 Jean-Eric Pin  
*Beyond Eilenberg’s Variety Theorem*

16:50–17:25 Mai Gehrke  
*Stone duality for languages and complexity*

**SHORT BREAK** (15 minutes)

**Afternoon session** (room 2.05)

17:45–18:05 Loris D’Antoni, Zachary Kincaid and Fang Wang  
*A Symbolic Decision Procedure for Symbolic Alternating Finite Automata*

18:10–18:30 Robert Glück and Robin Kaarsgaard  
*A categorical foundation for structured reversible flowchart languages*
CALCO – Wednesday, June 14th

8:30–9:00  Registration & Opening  

    in front of room 2.05

Joint tutorial on Metrics (room 2.05, chair: Andrej Bauer)

9:00–10:00  James Worrell  

    The expressiveness of metric temporal logic

COFFEE BREAK  

Joint special session on Metrics (room 2.05, chair: Prakash Panangaden)

10:30–11:05  Vincent Danos  

    Consensus

11:10–11:45  Catuscia Palamidessi  

    Verification of Differential Privacy in Concurrent Systems

11:50–12:25  Marco Gaboardi  

    A semantic account of metric preservation in presence of probabilities

LUNCH BREAK  

Semantics I (room 2.01, chair: Jamie Vicary)

14:00–14:25  Tomáš Jakl and Achim Jung  

    Free constructions and coproducts of d-frames

14:30–14:55  W. John Gowers and James Laird  

    Sequoidal Categories and Transfinite Games:  
    A Coalgebraic Approach to Stateful Objects in Game Semantics

15:00–15:25  Clovis Eberhart and Tom Hirschowitz  

    Justified Sequences in String Diagrams:  
    A Comparison Between Two Approaches to Concurrent Game Semantics

COFFEE BREAK  

Quantitative systems (room 2.01, chair: Jurriaan Rot)

16:00–16:25  Ana Sokolova and Harald Woracek  

    Termination in Convex Sets of Distributions

16:30–16:55  Corina Cirstea, Shunsuke Shimizu and Ichiro Hasuo  

    Parity Automata for Quantitative Linear Time Logics

17:00–17:10  Simone Barlocco and Clemens Kupke  

    Early Ideas: Automata Learning via Logic

17:15–17:25  Joshua Holland  

    Early Ideas: Coalgebraic operations on bi-infinite streams

17:30–23:00  City tour & Conference dinner  

    see the “Social events” section
MFPS – Wednesday, June 14th

Joint tutorial on Metrics (room 2.05, chair: Andrej Bauer)

9:00–10:00 James Worrell
The expressiveness of metric temporal logic

COFFEE BREAK (30 minutes)

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11:10–11:45 Catuscia Palamidessi
Verification of Differential Privacy in Concurrent Systems

11:50–12:25 Marco Gaboardi
A semantic account of metric preservation in presence of probabilities

LUNCH BREAK (1 hour 30 minutes)

Invited talk (room 2.05)

14:00–15:00 Dexter Kozen
Borel Coalgebra and Non-Wellfounded Logic

Afternoon session I (room 2.05)

15:00–15:25 Giorgio Bacci, Giovanni Bacci, Kim Guldstrand Larsen and Radu Mardare
Complete Axiomatization for the Total Variation Distance of Markov Chains

COFFEE BREAK (30 minutes)

Afternoon session II (room 2.05)

15:55–16:15 Bart Jacobs
A Note on Distances between Probabilistic and Quantum distributions

16:20–16:40 Nicolas Gagne and Prakash Panangaden
A categorical characterization of relative entropy on Polish spaces

16:45–17:05 Alex Simpson
Category-theoretic Structure for Independence and Conditional Independence

17:10–17:30 Mathys Rennela and Sam Staton
Classical control and quantum circuits in enriched category theory

17:30–23:00 CITY TOUR & CONFERENCE DINNER
see the “Social events” section
CALCO – Thursday, June 15th

**Coalgebraic Logics I** (room 2.01, chair: Corina Cirstea)

9:00–9:25 Fatemeh Seyfan, Lutz Schröder and Dirk Pattinson
*Uniform Interpolation in Coalgebraic Modal Logic*

9:30–9:55 Fredrik Dahlqvist and Alexander Kurz
*Positive coalgebraic logic*

**COFFEE BREAK** (30 minutes)

**Semantics II** (room 2.01, chair: Tom Hirschowitz)

10:30–10:55 Harald König and Uwe Wolter
*Being Van Kampen is a Uniqueness Property in Presheaf Topoi*

11:00–11:25 Jirí Adamek and Stefan Milius
*On Corecursive Algebras for Functors Preserving Coproducts*

11:30–11:55 Stefan Milius
*Proper Functors and their Rational Fixed Point*

12:00–12:25 Harsh Beohar and Sebastian Küpper
*On path-based coalgebras and weak notions of bisimulation*

**LUNCH BREAK** (1 hour 30 minutes)

**Invited talk** (room 2.01, chair: Barbara König)

14:00–15:00 Alex Simpson
*Probability sheaves and the Giry monad*

**String Diagrams and Quantum** (room 2.01, chair: Fabio Zanasi)

15:00–15:25 David Reutter and Jamie Vicary
*A 2-categorical approach to composing quantum structures*

15:30–15:55 David Reutter and Jamie Vicary
*A classical groupoid model for quantum networks*

**COFFEE BREAK** (30 minutes)

**State Machines (and No Coalgebra)** (room 2.01, chair: Henning Urbat)

16:30–16:55 Thomas Colcombet and Daniela Petrisan
*Automata minimization – a functorial approach*

17:00–17:25 Alexander Knapp and Till Mossakowski
*UML interactions meet state machines – an institutional approach*

17:30–17:45 Bart Jacobs, Kenta Cho
*CALCO Tools: The EfProb Library for Probabilistic Calculations*

**SHORT BREAK** (10 minutes)

18:00–19:30 **BUSINESS MEETING**
*in room 2.01*
Invited talk (room 2.05)
Amr Sabry
*From Reversible Programs to Univalent Universes and Back*
*with Jacques Carette, Chao-Hong Chen, Vikraman Choudhury, Robert Rose*

COFFEE BREAK (30 minutes)

Morning session (room 2.05)
Barry Jay
*Self-Quotation in a Typed, Intensional Lambda-Calculus*
Peter Dybjer and Hugo Moeneclaey
*Finitary Higher Inductive Types in the Groupoid Model*
Dariusz Biernacki, Sergueï Lenglet and Piotr Polesiuk
*Proving Soundness of Extensional Normal-Form Bisimilarities*
Niels F.W. Voorneveld
*Non-deterministic effects in a realizability model*
Clément Jacq and Paul-André Melliès
*On dialogue games and graph games*
**CALCO – Friday, June 16**

**Invited talk** (room 2.01, chair: Filippo Bonchi)

9:00–10:00  
Nicoletta Sabadini  
*CospanSpan (Graph) – an algebra for open, reconfigurable nets*

**COFFEE BREAK** (30 minutes)

**String Diagrams And Distributive Laws** (room 2.01, chair: Stefan Milius)

10:30–10:55  
Brendan Fong and Fabio Zanasi  
*A Universal Construction for (Co)relations*

11:00–11:25  
Dan Marsden and Fabrizio Genovese  
*Custom Hypergraph Categories via Generalized Relations*

11:30–11:55  
Henning Basold, Damien Pous and Jurriaan Rot  
*Monoidal Company for Accessible Functors*

12:00–12:10  
Joost Winter  
*Early Ideas: A completeness result for finite bisimulations up-to congruence*

12:15–12:25  
Florence Clerc, Prakash Panangaden and William Boshuck  
*Early Ideas: Towards a categorical understanding of variety theorems for quantitative algebras*

**LUNCH BREAK** (1 hour 30 minutes)

**Coalgebraic Logics II** (room 2.01, chair: Alexander Kurz)

14:00–14:25  
David Sprunger and Lawrence Moss  
*Substitutive relations and completeness for finitary set functors*

14:30–14:55  
Sebastian Enqvist and Yde Venema  
*Disjunctive bases – normal forms for modal logics*

15:00–15:25  
Zeinab Bakhtiari and Helle Hvid Hansen  
*Bisimulation for weakly expressive coalgebraic modal logics*

15:30–15:40  
Jason Castiglione  
*Early Ideas: Lazy Players Matching Pennies*

15:45–15:55  
Thorsten Wißmann  
*Early Ideas: A Coalgebraic Paige-Tarjan Algorithm*

**COFFEE BREAK** (30 minutes)

**Rational Behaviours** (room 2.01, chair: Henning Basold)

16:30–16:55  
Henning Urbat  
*Finite Behaviours and Finitary Corecursion*

17:00–17:10  
Barbara König and Christina Mika  
*Bisimulation Games on Coalgebras*

17:15–17:25  
Martin Glauer and Till Mossakowski  
*Early Ideas: Institutions for database schemas and datasets*

17:30–17:40  
Takeo Uramoto  
*Early Ideas: Finite automata and non-commutative analogue of lambda rings*

17:45–17:55  
Alessandra Di Pierro  
*Early Ideas: A Categorical Semantics for the Probabilistic lambda-calculus*

18:00–18:10  
Liang-Ting Chen  
*Early Ideas: Trace semantics via lax comonad*