POPL, VMCAI and Satellite events

2015 - Programme

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Local Information

VMCAI 2015 – Mumbai 12⁻14ᵗʰ January

VMCAI provides a forum for researchers from the communities of Verification, Model Checking, and Abstract Interpretation, facilitating interaction, cross-fertilization, and advancement of hybrid methods that combine these and related areas.

The program of VMCAI'15 will consist of refereed research papers and tool demonstrations, as well as invited lectures and tutorials. Research contributions can report new results as well as experimental evaluations and comparisons of existing techniques.

VMCAI 2015 would not be possible without the generosity of our Sponsors and Supporters

AstréeA: A Static Analyzer for Large Embedded Multi-Task Software

Antoine Mine

In this presentation we discuss our on-going efforts towards the efficient and precise verification of the absence of run-time errors, targeting shared-memory concurrent embedded C software.

Date: Monday 12th January
Time : 9.30 – 10.30
Room: Lecture Theatre AG66

Variations on the Stochastic Shortest Path Problem

Jean-Francois Raskin

In this invited contribution, we revisit the stochastic shortest path problem, and show how recent results allow one to improve over the classical solutions: we present algorithms to synthesize strategies with multiple guarantees on the distribution of the length of paths reaching a given target, rather than simply minimizing its expected value. The concepts and algorithms that we propose here are applications of more general results that have been obtained recently for Markov decision processes and that are described in a series of recent papers.

Date: Tuesday 13th January
Time : 9.30 – 10.30
Room: Lecture Theatre AG66

Early Verification

K. Rustan M. Leino

Technology that accurately models, analyzes, and verifies software has come a long way since its conception several decades ago. One mode of using such technology is to look for defects in software that has already left the hands of developers. Another mode is to integrate the technology into the process of software authoring. The advantage of this mode is that it lends analytical power to the developer's thinking. To be used in this way, the technology must be packaged in a way that is understandable, unobtrusive, and responsive.

In this talk, I showcase an integrated development environment that supports reasoning and verification, trying to provide an aid to the developer earlier during the software development process.

Date: Tuesday 13th January
Time : 14.00 – 15.00
Room: Lecture Theatre AG66

World-level   Quantifier Elimination

Supratik Chakraborty

Date: Wednesday 14th January
Time : 9.00 – 10.00
Room: Lecture Theatre AG66

Monday, 12ᵗʰ January – Lecture Theatre AG66	
9:00 – 9:30	Welcoming remarks from PC Chairs
9:30 – 10:30	Keynote: **Antoine Mine -** *AstréeA: A Static Analyzer for Large Embedded Multi-Task Software* (Chair: Agostino Cortesi)
10:30 – 11:00	Coffee break
11:00 – 12:30	Session 1: **Invariants and Induction** (Chair: Akash Lal)

Induction for SMT Solvers.
Andrew Reynolds and Viktor Kuncak.

Automatic Synthesis of Piecewise Linear Quadratic Invariants for Programs.
Assalé Adjé and Pierre-Loic Garoche.

Abstracting Induction by Extrapolation and Interpolation.
Patrick Cousot.

12:30 – 14:00	Lunch
14:00 – 15:30	Session 2: **Infinite-State Systems** (Chair: Pavithra Prabhakar)

Property Directed Polyhedral Abstraction.
Arie Gurfinkel and Nikolaj Bjorner.

Tree automata-based refinement with application to Horn clause verification.
Bishoksan Kafle and John P. Gallagher.

Analysis of infinite-state graph transformation systems by cluster abstraction.
Peter Backes and Jan Reineke.

15:30 – 16:00	Coffee break
16:00 – 18:00	Session 3: **Verification, Optimization and Debugging** (Chair: Arie Gurfinkel)

Proving Memory Safety of the ANI Windows Image Parser using Compositional Exhaustive Testing.
Maria Christakis and Patrice Godefroid

An Experimental Evaluation of Deliberate Unsoundness in a Static Program Analyzer.
Maria Christakis, Peter Müller and Valentin Wüstholz.
From Verification to Optimizations.
Rigel Gjomemo, Kedar Namjoshi, Phu H. Phung, Venkat Venkatakrishnan and Lenore Zuck

Debugging Process Algebra Specifications.
Gwen Salaün and Lina Ye

Tuesday, 13th January – Lecture Theatre AG66

Time	
9:30 – 10:30	Keynote: **Jean-Francois Raskin -** *Variations on the Stochastic Shortest Path Problem* (Chair: Andreas Podelski)
10:30 – 11:00	Coffee Break
11:00 – 12:30	Session 4: **Concurrency** (Chair: Ahmed Bouajjani)
	Effective Abstractions for Verification under Relaxed Memory Models. *Andrei Marian Dan, Yuri Meshman, Martin Vechev and Eran Yahav.*
	Abstracting and Counting Synchronizing Processes. *Zeinab Ganjei, Ahmed Rezine, Petru Eles and Zebo Peng.*
	Bounded Implementations of Replicated Data Types. *Madhavan Mukund, Gautham Shenoy R and S P Suresh.*
12:30 – 14:00	Lunch
14:00 – 15:00	Keynote: **Rustan Leino -** *Early Verification* (Chair: Lenore Zuck)
15:00 – 15:30	Coffee Break
15:30 – 17:30	Session 5: **Hybrid and Stochastic Systems** (Chair: S. Akshay)
	Distributed Markov Chains. *Ratul Saha, Javier Esparza, Sumit Kumar Jha, Madhavan Mukund and P S Thiagarajan.*
	Abstraction-based Computation of Reward Measures for Markov Automata. *Bettina Braitling, Luis María Ferrer Fioriti, Hassan Hatefi, Ralf Wimmer, Holger Hermanns and Bernd Becker.*
	Foundations of Quantitative Predicate Abstraction for Stability Analysis of Hybrid Systems. *Pavithra Prabhakar and Miriam García Soto.*
	A Hierarchy of Proof Rules for Checking Differential Invariance of Algebraic Sets. *Khalil Ghorbal, Andrew Sogokon and André Platzer.*
19:00 – 22:00	VMCAI Banquet at Vivanta Taj President

	Wednesday, 14th January – Lecture Theatre AG66
9:00 – 10:00	Keynote: **Supratik Chakraborty** - *World-level Quantifier Elimination* (Chair: Deepak D'Souza)
10:00 – 10:30	**A model for Industrial Real-Time Systems.** *Md Tawhid Bin Waez, Andrzej Wasowki, Juergen Dingel and Karen Rudie.*
10:30 – 11:00	Coffee break
11:00 – 12:30	Session 7: **Abstract Interpretation** (Chair: Mooly Sagiv) **Datacentric Semantics for Verification of Privacy Policy Compliance by Mobile Applications.** *Agostino Cortesi, Pietro Ferrara, Marco Pistoia and Omer Tripp.* **Proving Guarantee and Recurrence Temporal Properties by Abstract Interpretation.** *Caterina Urban and Antoine Miné.* **Path sensitive cache analysis using cache miss paths.** *Kartik Nagar and Y N Srikant.*
12:30 – 14:00	Lunch
14:00 – 15:30	Session 8: **Arrays and Heaps** (Chair: Xiokang Qui) **Dependent Array Type Inference from Tests.** *He Zhu, Aditya Nori and Suresh Jagannathan.* **Abstraction of Arrays Based on Non Contiguous Partitions.** *Jiangchao Liu and Xavier Rival.* **Automatic Inference of Heap Properties Exploiting Value** *Domains. Pietro Ferrara, Peter Müller and Milos Novacek.*
15:30 – 16:00	**Closing report from PC Chairs**
16:00 – 16:30	Coffee break

Modern networks are large, complex, and critical for society. Unfortunately, networks can also be unreliable. Network outages are common and often caused by bugs in network programs and configurations. These kinds of network outages are likely to become even more common, since networks continue to grow larger and become more complex. Therefore, we must develop tools and methods to help operators reason about network behavior, performance, and security.

Over the past several years, there has been a flurry of activity in this space. Several researchers in programming languages and verification communities have applied their expertise to develop tools and techniques for building and reasoning about networks. The goal of this informal workshop is to convene researchers interesting in applying their techniques to networking. The program will have both invited and contributed talks and plenty of time for discussion and debate.

PLVNET Invited Talks

Checking Beliefs and Contracts for Azure Using Z3

Nikolaj Bjorner, Microsoft Research

Date: Monday 12th January
Time : 9.00 – 9.40
Room: Seminar Room AG69

Reasoning about Network-State Evolution

Mooly Sagiv

Date: Monday 12th January
Time : 11.00 – 12.00
Room: Seminar Room AG69

From SDN to IoT: Tierless Programming and Reasoning with Flowlog

Shriram Krishnamurthi

Date: Monday 12th January
Time : 14.00 – 14.50
Room: Seminar Room AG69

	Monday, 12th January - Seminar Room AG69
9:00 – 9:40	Invited Talk: **Nikolaj Bjorner** *Checking Beliefs and Contracts for Azure Using Z3*
9:40 – 10:30	**Quality of Service Abstractions for Software-Defined Networks** *Cole Schlesinger, Hitesh Ballani, Thomas Karagiannis, Dimitrios Vytiniotis* **Programming the Internet of Things** *Sanjiva Prasad*
10:30 – 11:00	Coffee break
11:00 – 12:00	Invited Talk: **Mooly Sagiv** *Reasoning about Network-State Evolution*
12:00 – 12:25	**Temporal NetKAT** *Ryan Beckett, Michael Greenberg, David Walker*
12:25 – 14:00	Lunch
14:00 – 14:50	Invited Talk: **Shriram Krishnamurthi** *From SDN to IoT: Tierless Programming and Reasoning with Flowlog*
14:50 – 15:10	**Type Systems for SDN Controllers** *Marco Gaboardi, Michael Greenberg, David Walker*
15:10 – 15:30	**Network Updates for the Impatient: Eliminating Unnecessary Waits** *Jedidiah McClurg, Hossein Hojjat, Pavol Cerny, Nate Foster*
15:30 – 16:00	Coffee break
16:00 – 17:30	**Discussion**

CPP is an international forum on theoretical and practical topics in all areas, including computer science, mathematics, and education, that consider certification as an essential paradigm for their work. Certification here means formal, mechanized verification of some sort, preferably with production of independently checkable certificates.

CPP Keynotes

Formal Reasoning about the C11 Weak Memory Model

Viktor Vafeiadis

This abstract introduces the C11 weak memory model, summarises known verification results, and discusses some open problems.

Date: Tuesday 13th January
Time : 14.30 – 15.30
Room: D-Block Seminar Room D406

Clean-Slate Development of Certified OS Kernels

Zhong Shao

The CertiKOS project at Yale aims to develop new language-based technologies for building large-scale certified system software. Initially, we thought that verifying an OS kernel would require new program logics and powerful proof automation tools, but it should not be much different from standard Hoare-style program verification. After several years of trials and errors, we have decided to take a different path from the one we originally planned. We now believe that building large-scale certified system software requires a fundamental shift in the way we design the underlying programming languages, program logics, and proof assistants. In this talk, I outline our new clean-slate approach, explain its rationale, and describe various lessons and insights based on our experience with the development of several new certified OS kernels.

Date: Wednesday 14th January
Time : 11.00 – 12.00
Room: D-Block Seminar Room D406

Tuesday, 13th January – D' Block Seminar Room D406

Time	
9:00 – 10:30	**Session 1: Mechanized Semantics** **A Compositional Semantics for Verified Separate Compilation and Linking.** *Tahina Ramananandro, Zhong Shao, Shu-Chun Weng, Jérémie Koenig , Yuchen Fu.* **A Typed C11 Semantics for Interactive Theorem Proving.** *Robbert Krebbers, Freek Wiedijk.* **Certified Abstract Interpretation with Pretty Big-Step Semantics.** *Martin Bodin, Thomas Jensen, Alan Schmitt.*
10:30 – 11:00	Coffee break
11:00 – 12:30	**Session 2: Proof Certificates** ***Recording Completion for Certificates in Equational Reasoning*** *Thomas Sternagel, Sarah Winkler, Harald Zankl* ***Premise Selection and External Provers for HOL4*** *Thibault Gauthier, Cezary Kaliszyk* ***Certified Connection Tableaux Proofs for HOL Light and TPTP*** *Cezary Kaliszyk, Josef Urban, Jiri Vyskocil*
12:30 – 14:30	Lunch
14:30 – 15:30	Keynote: **Viktor Vafeiadis** *Formal Reasoning about the C11 Weak Memory Model*
15:30 – 16:00	Coffee break
16:00 – 17:30	**Session 4: Theorem Proving** **Completeness and Decidability of de Bruijn Substitution Algebra in Coq.** *Steven Schäfer, Gert Smolka, Tobias Tebbi* **A Decision Procedure for Univariate Real Polynomials in Isabelle/HOL** *Manuel Eberl* **Correctness of Isabelle's Cyclicity Checker: Implementability of Overloading in Proof Assistants.** *Ondřej Kunčar*

Wednesday 14th January - D-Block Seminar Room D406

Time	
9:00 – 10:30	Session 1: **Program Proof**
	Practical Tactics for Verifying C Programs in Coq. *Jingyuan Cao, Ming Fu, Xinyu Feng.* **Verified Validation of Program Slicing.** *Sandrine Blazy, Andre O. Maroneze, David Pichardie* **Proving Lock-Freedom Easily and Automatically.** *Wei Li, Xiao Jia, Viktor Vafeiadis*
10:30 – 11:00	Coffee Break
11:00 – 12:00	Keynote: **Zhong Shao** *Clean-Slate Development of Certified OS Kernels*
12:00 – 14:00	Lunch
14:00 – 15:30	Session 3: **Verified Algorithms**
	A Verified Algorithm for Geometric Zonotope/Hyperplane Intersection *Fabian Immler* **A Framework for Verifying Depth-First Search Algorithms.** *Peter Lammich, René Neumann* **Fixed Precision Patterns for the Formal Verification of Mathematical Constant Approximations**. *Yves Bertot*
15:30 – 16:00	Coffee Break
16:00 – 17:30	Session 4: **Mechanizing Computer Science**
17:00 - 17:30	**A lightweight formalization of the metatheory of bisimulation-up-to.** *Kaustuv Chaudhuri, Matteo Cimini, Dale Miller* **Certified Normalization of Context-Free Grammars.** *Denis Firsov, Tarmo Uustalu* **The Speedup Theorem in a Primitive Recursive Framework**. *Andrea Asperti*

PEPM 2015 – Mumbai 13 – 14th January

The PEPM Symposium/Workshop series aims at bringing together researchers and practitioners working in the areas of program manipulation, partial evaluation, and program generation. PEPM focuses on techniques, theory, tools, and applications of analysis and manipulation of programs.

PEPM Keynote

Desugaring in Practice: Opportunities and Challenges

Shriram Krishnamurthi

Desugaring, a key form of program manipulation, is a vital tool in the practical study of programming languages. Its use enables pragmatic solutions to the messy problems of dealing with real languages, but it also introduces problems that need addressing. By listing some of these challenges, this paper and talk aim to serve as a call to arms to the community to give the topic more attention.

Tuesday 13th January
Time : 11.15 – 12.30
Room: Seminar Room AG80

Tuesday, 13th January – Seminar Room AG80

11:00 – 11:15	Welcome by **Kenichi Asai and Kostis Sagonas**
11:15 – 12:30	Keynote: **Shriram Krishnamurthi** *Desugaring in Practice: Opportunities and Challenges* ***Recording Completion for Certificates in Equational Reasoning*** *Thomas Sternagel, Sarah Winkler, Harald Zankl* ***Premise Selection and External Provers for HOL4*** *Thibault Gauthier, Cezary Kaliszyk* ***Certified Connection Tableaux Proofs for HOL Light and TPTP*** *Cezary Kaliszyk, Josef Urban, Jiri Vyskocil*
12:30 – 14:00	Lunch
14:00 – 15:30	**Types / Code Mining** **Imperative Polymorphism by Store-Based Types as Abstract Interpretations** *Casper Bach Poulsen; Peter D. Mosses, Paolo Torrini* **Object-sensitive Type Analysis of PHP** *Henk Erik van der Hoek, Jurriaan Hage* **Structurally Heterogeneous Source Code Examples from Unstructured Knowledge Sources** *Venkatesh Vinayakarao, Rahul Purandare; Aditya Nori*
15:30 – 16:00	Coffee break
16:00 – 17:30	**Tree and Grammars** **Generalising Tree Traversals to DAGs** *Patrick Bahr, Emil Axelsson* **Incremental Evaluation of Higher Order Attributes** *Jeroen Bransen, Atze Dijkstra, S. Doaitse Swierstra* **Linearly Ordered Attribute Grammars** *L. Thomas van Binsbergen, Jeroen Bransen; Atze Dijkstra*

Wednesday 14th January – Seminar Room AG80

	Verification
9:00 – 10:30	**Verifying Relational Properties of Functional Programs by First-Order Refinement** *Kazuyuki Asada, Ryosuke Sato, Naoki Kobayashi* **Threads as Resources for Concurrency Verification** *Duy-Khanh Le, Wei Ngan Chin, Yong Meng Teo* **Constraint Specialisation in Horn Clause Verification** *Bishoksan Kafle, John P. Gallagher*
10:30 – 11:00	Coffee Break
	Transformation / Slicing
11:00 – 12:30	**SWIN: Towards Type-Safe Java Program Adaptation between APIs** *Jun Li; Chenglong Wang, Yingfei Xiong, Zenjiang Hu* **Safe Concurrency Introduction through Slicing** *Huiqing Li, Simon Thompson* **Static Backward Demand-Driven Slicing** *Bjorn Lisper, Abu Naser Masud, Husni Khanfar*
12:30 – 14:00	Lunch
	Analysis
14:00 – 15:00	**Type-based Exception Analysis for Non-strict Higher-order Functional Languages with Imprecise Exception Semantics** *Ruud Koot, Juriaan Hage* **Polivariant Cardinality Analysis for Non-strict Higher-order Functional Languages** *Hidde Verstoep, Jurriaan Hage*

On Tuesday, 13 January 2015, POPL is hosting a number of tutorials. These are 90 min talks oriented towards students in particular and other POPL attendees in general.

To avoid conflicts, each tutorial will be given twice according to the schedule on the following pages:.

○ T1: Programming using Automata and Transducers

Presenters: Loris D'Antoni and Margus Veanes

Abstract: Finite automata have proven to be an effective tool to reason about programs operating over strings, such as routing filters. Finite state transducers extend finite automata with outputs and can model functions from strings to strings such as natural language transformations and string sanitizers. Due to their closure and decidability properties, these models are widely used in practice, and many extensions/improvements have been proposed. In this tutorial we focus on language based approaches that aim at applying the properties of automata and transducers to practical applications. We first introduce the basics of automata and transducers over finite and infinite alphabets and their decidable properties, and then present some of the mechanisms for building programs based on these models. We present three different languages and show how they can be used to optimize and verify real programs with the aid of automata-based techniques. The first language, Bek, is used to verify string sanitizers for security to avoid cross-site scripting attacks; the second one, Bex, is used to verify the correctness of string encoders and decoders; and the third one, Fast, is used to optimize and verify functional programs over trees. Finally, we will discuss the limitations of these approaches and potential way to address such limitations.

Bio: Loris D'Antoni is a fifth year Ph.D. student in Computer Science at the University of Pennsylvania advised by Rajeev Alur. Loris's research centers on the use of formal methods, in particular transducers, to reason about programs. Typical applications are security, program verification, and program optimization.

Margus Veanes is a senior researcher at Microsoft. Margus received his Ph.D. in Computer Science from the University of Uppsala. Before joining Microsoft he worked as a postdoc in the Programming Logic group at Max Planck Institute for Computer Science in Saarbruecken. Margus's research interests are in program analysis with a focus on the use of symbolic automata theory in combination with state-of-the-art satisfiability modulo theories techniques, and model based testing.

○ T2: A Tutorial on Verifying Higher-Order, Effectful Programs Using F*

Presenters: F* Team

Abstract: F* is a new ML-like programming language designed for program verification. Specifications are expressed using refinement types, and pre- and post-conditions in the style of the Dijkstra monad---together, they enable describing precise properties of higher-order, effectful programs, up to functional correctness. Given a program and a claimed specification for it, F* produces verification conditions and discharges them using an SMT solver.
F* has been successfully used to verify a variety of programs, including the security of cryptographic protocol implementations; authorization properties of web browser extensions and cloud-hosted web applications; memory invariants of a model of the JavaScript runtime; and even the soundness of (a previous version of) the F* type-checker itself. The newest version of F* is open source, and compiles to F# and Ocaml; a JavaScript backend is also in the works.
This tutorial will be presented in two 90-minute sessions. Each session will begin with the same 30-minute introductory lecture on F*. We will spend the remainder of each session working in smaller groups in interactive mode, using the F* tool to program and verify the correctness of a number of small programs, including classic functional programs, programs that use state and other effects, and some small security-oriented examples. Depending on interest, we will also cover the use of F* as a proof assistant, showing how it can be used to mechanize the metatheory of small programming languages.

For the interactive part of the tutorial, it may be useful to have F* installed on your machine. You can obtain binaries for a variety of platforms from https://github.com/FStarLang/FStar. Depending on connectivity, we will also have a web interface to F* available for participants.

Bio: F* is a collaborative effort between Microsoft Research, INRIA, and IMDEA Software Institute. This tutorial will be delivered by Karthikeyan Bhargavan, Cédric Fournet, Catalin Hritcu, Aseem Rastogi and Nikhil Swam.y

○ T3: Probabilistic model checking

Presenter: Marta Kwiatkowska

Abstract: Probabilistic model checking is a formal verification technique for the automated analysis of systems that exhibit stochastic behaviour. Such behaviour may be due to, for example, component failure, randomisation, or uncertainty on the frequency of event occurrences. Similarly to probabilistic programming, stochasticity is represented by a random choice made according to a probability distribution, but nondeterministic choice is often featured, for example to model input nondeterminism or environment's decisions. The techniques focus on system dynamics rather than data, and thus concern models of systems and whether they meet given temporal logic properties. The models are probabilistic extensions of transition systems which can be obtained from a variety of modelling notations, including imperative programs with random assignment. Properties are specified in probabilistic extensions of temporal logic, and verification reduces to the computation of the probability or expectation of the probability being satisfied. For systems with nondeterministic choice, one can also construct optimal controllers that ensure the satisfaction of an objective specified by multiple properties. The techniques have been implemented in PRISM (www.prismmodelchecker.org) and enable a range of quantitative analyses of probabilistic models against specifications such as the worst-case probability of failure within 10 seconds or the minimum expected power consumption over all possible schedulings, as well as synthesis of strategies that simultaneously minimise energy consumption and maximise the probability of termination.
This tutorial will give an introduction to probabilistic model checking, explaining the underlying theory and algorithms for model checking and strategy synthesis. The material will be illustrated with several case studies that have been modelled and analysed in PRISM.

Bio: Marta Kwiatkowska is Professor at the University of Oxford. Her research is concerned with quantitative/probabilistic verification, which has been applied to a range of systems, from communication and security protocols to DNA computing, with genuine flaws found and corrected. She is known for leading the development of the probabilistic model checker PRISM (www.prismmodelchecker.org). Kwiatkowska gave the Milner Lecture in 2012 in recognition of "excellent and original theoretical work which has a perceived significance for practical computing", delivered keynotes at the ESEC/FSE 2007, ETAPS/FASE 2011 and ATVA 2013 conferences, and has given numerous tutorials. She is a member of Academia Europea, and will shortly receive an honorary doctorate from KTH. Kwiatkowska serves on editorial boards of several journals, including IEEE Transactions on Software Engineering, Formal Methods in System Design, and Information and Computation. Her research has been supported by grant funding from EPSRC, ERC, EU, DARPA and Microsoft Research Cambridge, including the prestigious ERC Advanced Grant VERIWARE "From software verification to everyware verification".

○ T4: Reachability Modulo Theories: Algorithms and Applications

Presenter: Akash Lal

Abstract: Program verifiers that attempt to automatically verify programs pose the verification problem as the decision problem: ¿Does there exist a proof that establishes the absence of errors? We instead pose program verification as: Does there exist an execution that establishes the presence of an error? to most directly match the most important and common use of automated program verification---bug-finding and debugging. We formalize the search for bugs as Reachability Modulo Theories (RMT). This tutorial will present basic complexity results on RMT and discuss Corral, an efficient verifier for RMT.

Our line of work on RMT offers a unique perspective on building practical verification tools. Traditional verifiers rely on proof-generation techniques such as predicate abstraction or interpolation. We instead rely on efficient search techniques powered by SMT solvers. Corral does almost all semantic reasoning and path exploration using SMT solvers, while encoding domain-specific knowledge via simple program transformations. For instance, Corral uses a program transformation (now commonly labeled as sequentializations) to compile away concurrency and reduce to the simpler setting of a sequential program. Corral uses other transformations to efficiently compile away assertions. Even abstraction is done using a program transformation. Invariant generation techniques are used in a plug-and-play manner to increase the efficiency of the search. The tutorial will do a deep-dive into the design of Corral.

The tutorial will also cover the use of Corral in a production environment to power the Static Driver Verifier (SDV). Corral now ships with SDV in every new version of the Windows operating system and is used routinely by driver developers both inside and outside Microsoft. The tutorial will discuss the challenges and solutions involved in taking verification technology to a production level.

Bio: Akash Lal is a researcher at Microsoft Research, Bangalore. His interests are in the area of programming languages and program analysis, with a focus on building bug-finding tools for concurrent programs. He joined Microsoft in 2009 after completing his PhD from University of Wisconsin-Madison under the supervision of Prof. Thomas Reps. For his thesis, he received the Outstanding Graduate Researcher Award, given by the Computer Sciences Department of UW-Madison, and the ACM SIGPLAN Outstanding Doctoral Dissertation Award. He completed his Bachelor's degree from IIT-Delhi in 2003.

◦ T5: Probabilistic Programming Languages and Semantics

Presenter: Prakash Panangaden

Abstract: Probabilistic reasoning has long been a part of computer science, however, probabilistic programming languages have recently emerged as a vital and growing area of interest to the POPL community. The 2014 POPL had a session on the topic. As far back as 1997 the probabilistic variant of concurrent constraint programming languages was proposed and in 1999 a POPL paper on the semantics of probabilistic ccp appeared. The recent reemergence of probabilistic ideas has been driven by an exciting new interaction between the machine learning community and the programming languages community.

Central to this interaction is the notion of conditional probability which is the analogue of implication, the fundamental logical counterpart to functional abstraction. Important topics that need to be understood are: (a) what are the probabilistic analogues of basic concepts like binary relations? (b) how does one describe behavioural similarity probabilistically? and (c) how does one capture probabilistic semantics?

Bio: Prakash has worked on probabilistic transition systems, bisimulation and probabilistic semantics for nearly 20 years. Along with Josee Desharnais and Abbas Edalat he proved a striking logical characterization theorem for bisimulation. He is the author of the book Labelled Markov Processes (Imperial College Press 2009) and several papers on probabilistic bisimulation, approximation of Markov processes, metrics for Markov processes, probabilistic semantics and applications to machine learning.

◦ T6: From Linear Logic to Session-Typed Concurrent Programming

Presenter: Frank Pfenning
In the realm of functional programming, the Curry-Howard isomorphism relates intuitionistic propositions to types, constructive proofs to programs, and proof reduction to computation. It has been an effective guide in designing programming abstractions because of the coherence between the logical and operational readings of programs. In this tutorial we apply this idea in the realm of message-passing concurrent computation. We interpret the propositions of linear logic as session types, its sequent proofs as process expressions, and cut reduction as communication. We then go a step further, adding recursive types, functional types, and recursively defined processes to arrive at a language with a rich combination of functional and concurrent programming constructs. We illustrate and explore programming in this language with a prototype implementation.

Bio Frank Pfenning is President's Professor and Head of the Computer Science Department at Carnegie Mellon University. He obtained his PhD in Mathematics at Carnegie Mellon University in 1987. He served as trustee and president of CADE, chaired several conferences and program committees including FoSSaCS 2013, LICS 2008, CADE 2007, and RTA 2006, and served on the editorial board of TCS, JAR, and JSC. His current research interests include expressive type systems for functional, concurrent, and logic programming languages, computer security, logical frameworks, and automated deduction

Tuesday 13th January			
	Homi Bhabha Auditorium	**Seminar Room AG69**	**Biology Seminar Room B333**
9:00 – 10:30	**T5: Probab. PL** *Probabilistic Programming Languages and Semantics*	**T1: Automata** *Programming using Automata and Transducers*	**T4: Pr. Model Checking** *Reachability Modulo Theories: Algorithms and Applications*
10:30 – 11:00	Coffee break		
11:00 – 12:30	**T5: Probab. PL** *Probabilistic Programming Languages and Semantics*	**T6: Session Types** *From Linear Logic to Session-Typed Concurrent Programming*	**T3: Reachability** *Probabilistic model checking*
12:30 – 14:00	Lunch		
14:00 – 15:30	**T2: F*** *A Tutorial on Verifying Higher-Order, Effectful Programs Using F**	**T6: Session Types** *From Linear Logic to Session-Typed Concurrent Programming*	**T4: Pr. Model Checking** *Reachability Modulo Theories: Algorithms and Applications*
15:30 – 16:00	Coffee break		
16:00 – 17:30	**T2: F*** *A Tutorial on Verifying Higher-Order, Effectful Programs Using F**	**T1: Automata** *Programming using Automata and Transducers*	**T3: Reachability** *Probabilistic model checking*

NOTES

The 2015 ACM SIGPLAN Programming Languages Mentoring Workshop (PLMW) is be held immediately before POPL 2015.

The goal of PLMW is to introduce newcomers (mainly young PhD students, along with some MSc and undergraduate students) to the field of programming language theory and formal verification, with a particular emphasis on women and under-represented minorities.

PLMW 2015 would not be possible without the generosity of our Sponsors and Supporters

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An Anonymous Donor

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Wednesday 14th January - Homi Bhabha Auditorium	
8:50 – 9:00	**Opening Remarks** *PLMW Organizers*
9:00 – 9:30	**You and your graduate reseach** *Nate Foster, Cornell University*
9:30 – 10:00	**Building automatic program verifiers** *Peter Müller, ETH Zurich*
10:00 – 10:30	**Proof theory and its role in programming language research** *Frank Pfenning, CMU*
10:30 – 11:00	Coffee break
11:00 – 11:30	**How to write a good research paper** *Stephanie Weirich, UPenn*
11:30 – 12:00	**Coinductive techniques from automata to coalgebra** *Damien Pous, CNRS, LIP, ENS Lyon*
12:00 – 12:30	**The story of Arjun Guha, or: The arc of a research project** *Shriram Krishnamurthi, Brown University*
12:30 – 14:00	Lunch
14:00 – 14:30	**Proof engineering: Implementation challenges in rigorously verified software** *Adam Chlipala, MIT*
14:30 – 15:00	**Formal verification of compilers and static analyzers** *Sandrine Blazy, IRISA, University of Rennes 1*
15:00 – 15:30	**Cultivating research taste (illustrated via a journey in program synthesis research** *Sumit Gulwani, Microsoft Research*
15:30 – 16:00	Coffee break
16:00 – 16:30	**Separation logic for weak memory models** *Viktor Vafeiadis*
16:30 – 17:00	**Repeatability, reproducibility and rigor in CS research** *Jan Vitek, Northeastern University*
17:00 – 17:30	**How to give a good research talk** *Stephanie Weirich, UPenn*

POPL 2015 – Mumbai 15⁻17ᵗʰ January

POPL is the annual Symposium on Principles of Programming Languages.

It is a forum for the discussion of all aspects of programming languages and programming systems.

Both theoretical and experimental papers are welcome, on topics ranging from formal frameworks to experience reports.

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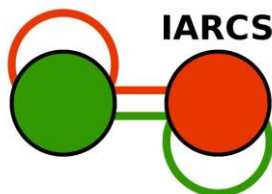
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Automating Repetitive Tasks for the Masses

Sumit Gulwani

The programming languages (PL) research community has traditionally catered to the needs of professional programmers in the continuously evolving technical industry. However, there is a new opportunity that knocks our doors. The recent IT revolution has resulted in the masses having access to personal computing devices. More than 99% of these computer users are non-programmers and are today limited to being passive consumers of the software that is made available to them. Can we empower these users to more effectively leverage computers for their daily tasks? The formalisms, techniques, and tools developed in the PL and the formal methods research communities can play a pivotal role!

Date: Thursday 15th January
Time : 9.30 – 10.30
Room: Homi Bhabha Auditorium

Coding by Everyone, Every Day

Peter Lee

In recent years, advances in machine learning and related fields have led to significant advances in a range of user-interface technologies, including audio processing, speech recognition, and natural language processing. These advances in turn have enabled speech-based digital assistants and speech-to-speech translation systems to become practical to deploy on a large scale. In essence, machines are becoming capable of hearing what we are saying. But will they understand what we want them to do when we talk to them? What are the prospects for getting useful work done in essence, by synthesizing programs -- through the act of having a conversation with a computer? In this lecture, I will speculate on the central role that programming-language design and program synthesis may have in this possible -- and I will argue, likely -- future of computing, one in which every user writes programs, every day, by conversing with a computing system.

Date: Friday 16th January
Time : 16.00 – 17.00
Room: Homi Bhabha Auditorium

Database and Programming: Two Subjects Divided by a Common Language?

Peter Buneman

The 1990s saw a hugely productive interaction between database and programming language research. Ideas about type systems from programming languages played a central role in generalizing and adapting relational database systems to new data models. At the same time databases provided some of the best concrete examples of the application of concurrency theory and of the benefits of high-level optimization in functional programming languages. One of the driving ambitions behind this research was the idea that database access should be properly embedded in programming languages: one should not have to be bilingual in order to use a database from a programming language; and that goal has to some extent been realized.

In the past fifteen years, new data models, both for data storage and for data exchange have appeared with depressing regularity and with each such model, the inevitable query language. Does programming language research have anything to contribute to these new languages? Should we take the time to to worry about embedding these models in conventional languages? Over the same period, some interesting new connections between databases and programming languages have emerged, notably in the areas of scientific databases, annotation and provenance. Will this provide new opportunities for cross-fertilization?

Date: Friday 17th January
Time : 9.00 – 10.00
Room: Homi Bhabha Auditorium

Thursday 15th January - Homi Bhabha Auditorium (HBA) + Lecture Theatre AG66 / AG69	
9:10 – 9:20	Welcoming Remarks: Sriram Rajamani and David Walker
9:20 – 9:30	Milner Award
9:30 – 10:30	Keynote: **Sumit Gulwani** - *Automating Repetitive Tasks for the Masses* - **HBA** (Chair: Sriram Rajamani, Microsoft Research)
10:30 – 11:00	Coffee break
11:00 – 12:30	Session 1A: **Types I - HBA** (Chair: Jeremy Gibbons, Oxford University)

Functors are Type Refinement Systems
Paul-André Melliès (CNRS, Université Paris Diderot)
Noam Zeilberger (MSR-Inria)

Integrating Linear and Dependent Types
Neel Krishnaswami (University of Birmingham)
Pierre Pradic (ENS Lyon)
Nick Benton (Microsoft Research)

Higher Inductive Types as Homotopy-Initial Algebras
Kristina Sojakova (Carnegie Mellon University)

Session 1B: **Security - AG66** (Chair: Karthikeyan Bhargavan, Inria)

Runtime Enforcement of Security Policies on Black Box Reactive Programs
Minh Ngo (University of Trento)
Fabio Massacci (University of Trento)
Dimiter Milushev (KU Leuven)
Frank Piessens (KU Leuven)

Higher-Order Approximate Relational Refinement Types for Mechanism Design and Differential Privacy
Gilles Barthe (IMDEA Software Institute)
Marco Gaboardi (University of Dundee)
Emilio Gallego Arias (University of Pennsylvania)
Justin Hsu (University of Pennsylvania)
Aaron Roth (University of Pennsylvania)
Pierre-Yves Strub (IMDEA Software Institute)

Differential Privacy: Now it's Getting Personal
Hamid Ebadi (Chalmers University of Technology)
David Sands (Chalmers University of Technology)
Gerardo Schneider (Chalmers University of Technology)

12:30 – 14:00	Lunch
14:00 – 15:30	Session2A:**Program Analysis I–HBA** (Chair: Raghavan Komondoor, IISc Bangalore)

Summary-Based Context-Sensitive Data-Dependence Analysis in Presence of Callbacks
Hao Tang (Peking University, China)
Xiaoyin Wang (University of Texas at San Antonio)
Lingming Zhang (University of Texas at Dallas)
Bing Xie (Peking University, China)
Lu Zhang (Peking University, China)
Hong Mei (Peking University, China)

Faster Algorithms for Algebraic Path Properties in RSMs with Constant Treewidth
Krishnendu Chatterjee (IST Austria)
Prateesh Goyal (IIT Bombay)
Rasmus Ibsen-Jensen (IST Austria)
Andreas Pavlogiannis (IST Austria)

Predicting Program Properties from "Big Code"
Veselin Raychev (ETH Zurich)
Martin Vechev (ETH Zurich)
Andreas Krause (ETH Zurich)

Session 2B: **Domain-specific Languages**-AG66 (Chair: Stephanie Weirich, UPenn)

DReX: A Declarative Language for Efficiently Computable Regular String Transformations
Rajeev Alur (University of Pennsylvania)
Loris D'Antoni (University of Pennsylvania)
Mukund Raghothaman (University of Pennsylvania)

Data Parallel String Manipulating Programs
Margus Veanes (Microsoft Research)
Todd Mytkowicz (Microsoft Research)
David Molnar (Microsoft Research)
Ben Livshits (Microsoft Research)

Ur/Web: A Simple Model for Programming the Web
Adam Chlipala (MIT CSAIL)

15:30 – 16:00	Coffee break

| 16:00 – 17:30 | Session 3A: **Dynamic Verification – HBA** (Chair:Jan Vitek, Northeastern University) |

Safe and Efficient Gradual Typing for TypeScript
Aseem Rastogi (University of Maryland, College Park)
Nikhil Swamy (Microsoft Research)
Cedric Fournet (Microsoft Research)
Gavin Bierman (Oracle Labs)
Panagiotis Vekris (University of California, San Diego)

Space-Efficient Manifest Contracts
Michael Greenberg (Princeton University)

Manifest Contracts for Datatypes
Taro Sekiyama (Kyoto University)
Yuki Nishida (Kyoto University)
Atsushi Igarashi (Kyoto University)

Session 3B: **Concurrency I - AG66**   (Chair: Mooly Sagiv, Tel Aviv University)

Common Compiler Optimisations are Invalid in the C11 Memory Model and What We Can Do About It
Viktor Vafeiadis (MPI-SWS)
Thibaut Balabonski (INRIA)
Soham Chakraborty (MPI-SWS)
Robin Morisset (INRIA)
Francesco Zappa Nardelli (INRIA)

From Communicating Machines to Graphical Choreographies
Julien Lange (Imperial Colllege London)
Emilio Tuosto (University of Leicester)
Nobuko Yoshida (Imperial Colllege London)

A Scalable, Correct Time-Stamped Stack
Mike Dodds (University of York)
Andreas Haas (University of Salzburg)
Christoph M. Kirsch (University of Salzburg)

17:30 – 18:30	SRC Poster Session **Homi Bhabha Foyer**	SIGPLAN Business Meeting : Find out more about SIGPLAN's activities and how you can help steer our SIG **- AG66**
18:30 – 19:30	Cultural Program - Homi Bhabha Auditorium	
19:30 – 22:30	Reception Dinner – TIFR Lawns	

Friday 16th January - Homi Bhabha Auditorium + Lecture Theatre AG66 / AG69

6:00 – 6:30	Morning 5K run at Marine Drive

9:00 – 10:30

Session 4A: Compiler Correctness - HBA   (Chair: Adam Chlipala, MIT)

Formal Verification of a C Static Analyzer
Jacques-Henri Jourdan (Inria Paris-Rocquencourt)
Vincent Laporte (IRISA and U. Rennes 1)
Sandrine Blazy (IRISA and U. Rennes 1)
Xavier Leroy (Inria Paris-Rocquencourt)
David Pichardie (IRISA and ENS Rennes)

Analyzing Program Analyses
Roberto Giacobazzi (University of Verona)
Francesco Logozzo (Microsoft Research)
Francesco Ranzato (University of Padova)

Compositional CompCert
Gordon Stewart (Princeton University)
Lennart Beringer (Princeton University)
Santiago Cuellar (Princeton University)
Andrew W. Appel (Princeton University)

Session 4B: Types II - AG66   (Chair: Deepak Garg, MPI-SWS)

Polymorphic Functions with Set-Theoretic Types. Part 2: Local Type Inference and Type Reconstruction
Giuseppe Castagna (CNRS - Université Paris Diderot)
Kim Nguyen (LRI - Université Paris Sud)
Zhiwu Xu
Pietro Abate (Université Paris Diderot)

Principal Type Schemes for Gradual Programs
Ronald Garcia (University of British Columbia)
Matteo Cimini (Indiana University)

Dependent Information Flow Types
Luísa Lourenço (CITI and NOVA-LINCS / Universidade Nova de Lisboa)
Luís Caires (CITI and NOVA-LINCS / Universidade Nova de Lisboa)

10:30 – 11:00	Coffee Break

11:00 – 12:30

Session 5A: Regular Languages & Automata - HBA
                              (Chair: Supratik Chakraborty, IIT Bombay)

Abstract Symbolic Automata
Mila Dalla Preda (University of Verona)
Roberto Giacobazzi (University of Verona)
Arun Lakhotia (University of Louisiana)
Isabella Mastroeni (University of Verona)

A Coalgebraic Decision Procedure for NetKAT
Nate Foster (Cornell University)
Dexter Kozen (Cornell University)
Matthew Milano (Cornell University)
Alexandra Silva (Raboud University Nijmegen)
Laure Thompson (Cornell University)

Symbolic Algorithms for Language Equivalence and Kleene Algebra with Tests
Damien Pous (CNRS, France)

11:00 – 12:30	Session 5B: **Programming Models I** – **AG66** (Chair: Frank Pfenning, CMU)
	Programming up to Congruence *Vilhelm Sjöberg (University of Pennsylvania)* *Stephanie Weirich (University of Pennsylvania)* **A Meta Lambda Calculus with Cross-Level Computation** *Kazunori Tobisawa (Graduate School of Mathematical Sciences, The University of Tokyo)* **Algebraic Effects, Linearity, and Quantum Programming Languages** *Sam Staton (Radboud University Nijmegen)*
12:30 – 14:00	Lunch
14:00 – 15:30	Session 6A: **Concurrency II - HBA** (Chair:Nishant Sinha,IBM Research India
	Proof Spaces for Unbounded Parallelism *Azadeh Farzan (University of Toronto)* *Zachary Kincaid (University of Toronto)* *Andreas Podelski (University of Freiburg)* **Equations, Contractions, and Unique Solutions** *Davide Sangiorgi (University of Bologna and INRIA)* **Succinct Representation of Concurrent Trace Sets** *Ashutosh Gupta (IST Austria)* *Thomas A. Henzinger (IST Austria)* *Arjun Radhakrishna (IST Austria)* *Roopsha Samanta (IST Austria)* *Thorsten Tarrach (IST Austria)*
	Session 6B: **Semantics - AG66** (Chair: Arjun Guha, University of Massachusetts, Amherst)
	K-Java: A Complete Semantics of Java *Denis Bogdanas (Alexandru Ioan Cuza University Iasi, Romania)* *Grigore Rosu (University of Illinois at Urbana-Champaign)* **Towards the Essence of Hygiene** *Michael D. Adams (University of Utah, University of Illinois at Urbana/Champaign)* **Self-Representation in Girard's System U** *Matt Brown (UCLA)* *Jens Palsberg (UCLA)*
15:30 – 16:00	Break
16:00 – 17:00	Keynote: **Peter Lee -** *Coding by Everyone, Every Day* - **HBA** (Chair: David Walker, Princeton University)
17:00 - 17:30	POPL 2015 Report
17:30 – 17:45	POPL 2016 Preview
18:30 – Late	Banquet & Award for Most Influential Paper POPL 2005

Saturday, 17th January - Homi Bhabha Auditorium + Lecture Theatre AG66 / AG69

9:00 – 10:00	Keynote: **Peter Buneman** - *Database and Programming: Two Subjects Divided by a Common Language* **– HBA** (Chair: Paritosh Pandya, TIFR)
10:00 – 10:30	Coffee break

10:30 – 11:30

Session 7A: **Probabilistic Programs** **– HBA**   (Chair: S Akshay, ITT Bombay)

Probabilistic Termination
Luis Maria Ferrer Fioriti (Saarland University)
Holger Hermanns (Saarland University)

Leveraging Weighted Automata to Compositional Reasoning about Concurrent Probabilistic Systems
Fei He (Tsinghua University)
Xiaowei Gao (Tsinghua University)
Bow-Yaw Wang (Academia Sinica)
Lijun Zhang (Institute of Software, Chinese Academy of Sciences)

Session 7B: **Programming Models II** - AG66

      (Chair: Roberto Giacobazzi, U. of Verona)

Full Abstraction for Signal Flow Graphs
Filippo Bonchi (Ecole Normale Supérieure Lyon; France)
Pawel Sobocinski (University of Southampton, UK)
Fabio Zanasi (Ecole Normale Supérieure Lyon; France

Conjugate Hylomorphisms: The Mother of All Structured Recursion Schemes
Ralf Hinze (University of Oxford)
Nicolas Wu (University of Oxford)
Jeremy Gibbons (University of Oxford)

11:30 – 12:30	**Remembering Rahdia Cousot, Susan Horwitz - HBA**
12:30 – 14:00	Lunch

14:00 – 15:30

Session 8A: **Program Analysis II** - HBA   (Chair: Akash Lal, Microsoft Research)

Quantitative Interprocedural Analysis
Krishnendu Chatterjee (IST Austria)
Andreas Pavlogiannis (IST Austria)
Yaron Velner (Tel Aviv University)

Specification Inference Using Context-Free Language Reachability
Osbert Bastani (Stanford University)
Saswat Anand (Stanford University)
Alex Aiken (Stanford Univeristy)

On Characterizing the Data Access Complexity of Programs
Venmugil Elango (The Ohio State University)
Fabrice Rastello (Inria)
Louis-Noel Pouchet (University of California Los Angeles)
J. Ramanujam (Louisiana State University)
P. Sadayappan (The Ohio State University)

14:00 – 15:30	**Session 8B: Verification - AG66** (Chair: Sumit Gulwani, Microsoft Research)

Sound Modular Verification of C Code Executing in an Unverified Context
Pieter Agten (iMinds-DistriNet, KU Leuven)
Bart Jacobs (iMinds-DistriNet, KU Leuven)
Frank Piessens (iMinds-DistriNet, KU Leuven)

Deep Specifications and Certified Abstraction Layers
Ronghui Gu (Yale University)
Jeremie Koenig (Yale University)
Tahina Ramananandro (Yale University)
Zhong Shao (Yale University)
Newman Wu (Yale University)
Shu-chun Weng (Yale University)
Haozhong Zhang (University of Science and Technology of China)
Yu Guo (University of Science and Technology of China)

From Network Interface to Multithreaded Web Applications: A Case Study in Modular Program Verification
Adam Chlipala (MIT CSAIL)

15:30 – 16:00	Coffee break

16:00 – 17:30	**Session 9A: Concurrency III - HBA** (Chair: Rupak Majumdar, MPI-SWS)

A Calculus for Relaxed Memory
Karl Crary (Carnegie Mellon University)
Michael Sullivan (Carnegie Mellon University)

Iris: Monoids and Invariants as an Orthogonal Basis for Concurrent Reasoning
Ralf Jung (MPI-SWS, Germany)
David Swasey (MPI-SWS, Germany)
Filip Sieczkowski (Aarhus University)
Kasper Svendsen (Aarhus University)
Aaron Turon (Mozilla Research)
Lars Birkedal (Aarhus University)
Derek Dreyer (MPI-SWS, Germany)

Tractable Refinement Checking for Concurrent Objects
Ahmed Bouajjani (LIAFA Université Paris Diderot; France)
Michael Emmi (IMDEA Software Institute, Spain)
Constantin Enea (LIAFA Université Paris Diderot; France)
Jad Hamza (LIAFA Université Paris Diderot; France)

Session 9B: Synthesis   - AG66   (Chair: Swarat Chaudri, Rice University)

Decentralizing SDN Policies
Oded Padon (Tel Aviv University)
Neil Immerman (University of Massachusetts, Amherst)
Aleksandr Karbyshev (Tel Aviv University)
Ori Lahav (Tel Aviv University)
Mooly Sagiv (Tel Aviv University)
Sharon Shoham (The Academic College of Tel Aviv Yaffo)

Program Boosting: Program Synthesis via Crowd-Sourcing
Robert A Cochran (University of North Carolina at Chapel Hill)
Loris D'Antoni (University of Pennsylvania)
Benjamin Livshits (Microsoft Research)
David Molnar (Microsoft Research)
Margus Veanes (Microsoft Research)

Fiat: Deductive Synthesis of Abstract Data Types in a Proof Assistant
Benjamin Delaware (MIT CSAIL)
Clément Pit-Claudel (MIT CSAIL)
Jason Gross (MIT CSAIL)
Adam Chlipala (MIT CSAIL)

CoqPL 2015 – Mumbai 18th January

The CoqPL workshop provides an opportunity for programming languages researchers to meet and interact with one another and members from the core Coq development team. At the meeting, co-located with POPL 2015 in Mumbai, January 2015, we will discuss upcoming new features, see talks and demonstrations of exciting current projects, solicit feedback for potential future changes, and generally work to strengthen the vibrant community around our favorite proof assistant.

CoqPL Invited Talk

Bedrock: A Clean-Slate Platform for Developing Verified Software Inside a Proof Assistant

Adam Chlipala

Date: Sunday 18th January
Time : 9.00 – 10.00
Room: Seminar Room AG80

	Sunday 18th January - Seminar Room AG80
9:00 – 10:00	Invited Talk: **Adam Chlipala** *Bedrock: A Clean-Slate Platform for Developing Verified Software Inside a Proof Assistant*
10:00 – 10:30	**Verification of Faust Signal Processing Programs in Coq** *Emilio Jesús Gallego Arias, Olivier Hermant and Pierre Jouvelot*
10:30 – 11:00	Coffee break
11:00 – 12:30	**Towards Structured Mechanized Verification of Fine-Grained Concurrent Programs** *Ilya Sergey, Aleksandar Nanevski and Anindya Banerjee* **Peek: A Formally Verified Peephole Optimization Framework for x86** *Eric Mullen, Zachary Tatlock and Dan Grossman* **Formalizing C in Coq** *Robbert Krebbers and Freek Wiedijk*
12:30 – 14:00	Lunch
14:00 – 15:30	**A Profiler for Ltac** *Tobias Tebbi and Jason Gross* **Rtac: A Fully Reflective Tactic Language** *Gregory Malecha and Jesper Bengtson* **A Coq Framework For Verified Property-Based Testing** *Zoe Paraskevopoulou, Catalin Hritcu, Maxime Dénès,* *Leonidas Lampropoulos and Benjamin C. Pierce*
15:30 – 16:00	Coffee break
16:00 – 16:30	**Coq Bug Minimizer** *Jason Gross*
16:30 – 17:30	**Talk by the Coq developers**

Programming language researchers have the principles, tools, algorithms and abstractions to solve all kinds of problems, in all areas of computer science. However, identifying and evaluating new problems, particularly those that lie outside the typical core PL problems we all know and love, can be a significant challenge. This workshop's goal is to identify and discuss problems that do not often show up in our top conferences, but where programming language research can make a substantial impact. We hope fora like this will increase the diversity of problems that are studied by PL researchers and thus increase our community's impact on the world.

While many workshops associated with POPL have become more like mini-conferences themselves, this is an anti-goal for OBT. The workshop will be informal and structured to encourage discussion. We are at least as interested in problems as in solutions.

OBT Invited Talk

Beyond Open Source: The TouchDevelop Cloud-based Integrated Development Environment

Tom Ball

Time : 9.00 – 10.00, Sunday 18th January
Room: Seminar Room AG69

Compilers Without Borders: Repurposing Paper, Plastic, and Household Devices as Computational Substrates

Bill Thies

Date: Sunday 18th January
Time : 14.00 – 15.00
Room: Seminar Room AG69

Sunday 18th January - Seminar Room AG69	
9:00 – 10:00	Invited Talk: **Tom Ball** *Beyond Open Source: The TouchDevelop Cloud-based Integrated Development Environment*
10:00 – 10:30	**Language Technologies for Lighting up Learning** *Sumit Gulwani and Rishabh Singh*
10:30 – 11:00	Coffee break
11:00 – 12:30	**Curry-Howard for GUIs** *Neelakantan Krishnaswami, Jennifer Paykin and Steve Zdancewic* **Implicit Computational Complexity, Non-uniformity and the Lambda-Calculus** *Damiano Mazza* **A connection between lambda calculus and maps** *Noam Zeilberger*
12:30 – 14:00	Lunch
14:00 – 15:00	Invited Talk: **Bill Thies** *Compilers Without Borders: Repurposing Paper, Plastic, and Household Devices as Computational Substrates*
15:00 – 15:30	**Code Similarity via Natural Language Descriptions** *Meital Ben Sinai and Eran Yahav*
15:30 – 16:00	Coffee break
16:00 – 17:00	**A new approach to building solvers** *Rohit Singh and Armando Solar-Lezama* **Constraint Programming Languages for Big Data Applications** *Francesca Rossi and Vijay Saraswat*

WEPL 2015 – Mumbai 18th January

POPL is a premier annual international forum for the discussion of all aspects of programming languages and programming systems. The objectives of WEPL are to present the views of eminent researchers on emerging topics in these areas, and to introduce POPL attendees to activities and opportunities in these areas in universities, institutions, and companies located in India. The workshop will feature invited technical talks by eminent researchers, a poster session for students and faculty to present innovative technical ideas and results, as well as a panel discussion by experts from industry as well as academia. WEPL is aimed at 3rd and 4th year UG engineering students, Masters and PhD students, as well as faculty members.

Sunday, 18th January – Lecture Theatre AG66	
9:00 – 9:15	Welcome
9:15 – 10:00	**V. Krishna Nandivada**
10:00 – 10:45	**G. Ramalingam**
10:45 – 11:15	Coffee break and Poster Session
11:15 – 12:00	**Y.N. Srikant**
12:00 – 12:45	**Aditya Kanade**
12:45 – 14:00	Lunch
14:00 – 14:45	**Supratik Chakraborty**
14:45 – 15:30	**Rupesh Nasre**
15:30 – 15:45	Coffee break
15:45 – 17:00	**Panel Discussion moderated by Supratik Chakraborty** *Deepak D'Souza, Uday Khedker, R.D. Naik, Prahladavaradan Sampath*

Venue

Venue Address:

Tata Institute of Fundamental Research (TIFR)
Dr. Homi Bhabha Road
Navy Nagar
Mandir Marg
Colaba
Mumbai, Maharashtra - 400005.

How to get to TIFR:

A Shuttle service will be running from and to TIFR – Daily schedule on the following page

For other destinations, please refer to POPL's webpage: http://w3.kwconferences.com/popl/venue.htm

12th Jan 2015	Hotel - Venue		Venue - Hotel	
	Shuttle 1	Shuttle 2	Shuttle 1	Shuttle 2
Supreme	8:10 AM	-	6:10 PM	-
Taj Vivanta	8:12 AM	-	6:10 PM	-
Victoria	7:47 AM	-	6:10 PM	-
Grand	7:45 AM	-	6:10 PM	-
Westend	8:02 AM	-	6:10 PM	-
Astoria	8:07 AM	-	6:10 PM	-
Sea Palace	7:45 AM	-	6:10 PM	-
YWCA	7:50 AM	-	6:10 PM	-
Trident	7:55 AM	-	6:10 PM	-

13th Jan 2015	Hotel - Venue		Venue - Hotel	
	Shuttle 1	Shuttle 2	Shuttle 1	Shuttle 2
Supreme	8:20 AM	8:45 AM	5:40 PM	6:10 PM
Taj Vivanta	8:22 AM	8:50 AM	5:40 PM	6:10 PM
Victoria	8:12 AM	-	5:40 PM	-
Grand	8:10 AM	-	5:40 PM	-
Westend	8:15 AM	-	5:40 PM	-
Astoria	8:20 AM	-	5:40 PM	-
Sea Palace	8:15 AM	-	5:40 PM	-
YWCA	8:17 AM	-	5:40 PM	-
Trident	8:10 AM	-	5:40 PM	-

13th Jan VMCAI Banquet	TIFR - Taj Vivanta	Taj Vivanta - Hotel
All official Hotels	6:15 PM	22:00 PM

14th Jan 2015	Hotel - Venue		Venue - Hotel	
	Shuttle 1	Shuttle 2	Shuttle 1	Shuttle 2
Supreme	8:20 AM	8:45 AM	5:40 PM	6:10 PM
Taj Vivanta	8:22 AM	8:50 AM	5:40 PM	6:10 PM
Victoria	8:12 AM	-	5:40 PM	-
Grand	8:10 AM	-	5:40 PM	-
Westend	8:15 AM	-	5:40 PM	-
Astoria	8:20 AM	-	5:40 PM	-
Sea Palace	8:15 AM	-	5:40 PM	-
YWCA	8:17 AM	-	5:40 PM	-
Trident	8:10 AM	-	5:40 PM	-

15th Jan 2015	Hotel - Venue		Venue – Hotel	
	Shuttle 1	Shuttle 2	Shuttle 1	Shuttle 2
Supreme	8:20 AM	8:45 AM	10:00 PM	10:20 PM
Taj Vivanta	8:22 AM	8:50 AM	10:00 PM	10:20 PM
Victoria	8:12 AM	-	10:00 PM	-
Grand	8:10 AM	-	10:00 PM	-
Westend	8:10 AM	-	10:00 PM	-
Astoria	8:15 AM	-	10:00 PM	-
Sea Palace	8:15 AM	-	10:00 PM	-
YWCA	8:17 AM	-	10:00 PM	-
Trident	8:05 AM	-	10:00 PM	-

16th Jan 2015	Hotel - Venue		Venue - Hotel	
	Shuttle 1	Shuttle 2	Shuttle 1	Shuttle 2
Supreme	8:20 AM	8:45 AM	5:40 PM	6:10 PM
Taj Vivanta	8:22 AM	8:50 AM	5:40 PM	6:10 PM
Victoria	8:12 AM	-	5:40 PM	-
Grand	8:10 AM	-	5:40 PM	-
Westend	8:15 AM	-	5:40 PM	-
Astoria	8:20 AM	-	5:40 PM	-
Sea Palace	8:15 AM	-	5:40 PM	-
YWCA	8:17 AM	-	5:40 PM	-
Trident	8:10 AM	-	5:40 PM	-

16th Jan 2015	TIFR – ITC Grand	ITC Grand - TIFR
	Shuttle 1	Shuttle 1
Banquet	5:45 PM	22:00 PM

17th Jan 2015	Hotel - Venue		Venue - Hotel	
	Shuttle 1	Shuttle 2	Shuttle 1	Shuttle 2
Supreme	8:20 AM	8:45 AM	5:40 PM	6:10 PM
Taj Vivanta	8:22 AM	8:50 AM	5:40 PM	6:10 PM
Victoria	8:12 AM	-	5:40 PM	-
Grand	8:10 AM	-	5:40 PM	-
Westend	8:15 AM	-	5:40 PM	-
Astoria	8:20 AM	-	5:40 PM	-
Sea Palace	8:15 AM	-	5:40 PM	-
YWCA	8:17 AM	-	5:40 PM	-
Trident	8:10 AM	-	5:40 PM	-

18th Jan 2015	Hotel - Venue		Venue - Hotel	
	Shuttle 1	Shuttle 2	Shuttle 1	Shuttle 2
Supreme	8:10 AM	-	6:10 PM	-
Taj Vivanta	8:12 AM	-	6:10 PM	-
Victoria	7:47 AM	-	6:10 PM	-
Grand	7:45 AM	-	6:10 PM	-
Westend	8:02 AM	-	6:10 PM	-
Astoria	8:07 AM	-	6:10 PM	-
Sea Palace	7:45 AM	-	6:10 PM	-
YWCA	7:50 AM	-	6:10 PM	-
Trident	7:55 AM	-	6:10 PM	-

<u>Stay Safe!</u>

◦ Keep your money and credit cards safe at all times. Always carry some cash as many places do not accept credit /debit cards
◦ Beware of pickpockets in public places
◦ Advisable to avoid street food as much as possible
◦ Drink only bottled water and check that the seal is intact when you receive it
◦ Avoid raw vegetables, uncooked seafood and peeled fruit outside the venue
◦ Avoid food and drinks from street vendors
◦ Do not leave your belongings unattended
◦ If travelling alone, it is advisable to always have the GPS navigation support on for safety purposes
◦ It is advisable to never take lifts from strangers when travelling within the city
◦ Always hire a taxi with meter on and do not allow other strangers to share it with you

Local information

Get Around Mumbai: Local Travel

By Taxi:
Black and Yellow Taxi: Taxis are cheap and plentiful. Most taxis in Mumbai are small-medium sized cars (non air-conditioned), painted black-and-yellow (black on lower body and yellow on roof) which are usually Hyundai Santro and Suzuki Altos, with electronic meters. You can hail a cab off the streets. At the start of the journey, ensure that the meter is visible and shows the flag-down fare/meter reading that currently stands at Rs. 21/- during the day & Rs. 26/- during the night post 9 PM.

Private Taxi: These are more comfortable in comparison to the Black and Yellow taxis at a small surcharge of 25 percent over a normal taxi. These services operate modern fleets with well trained drivers and government-approved tariffs. You can get them at 30-60 minutes notice, they are clean, air-conditioned, equipped with digital, tamper-proof meters, punctual, honest, and GPS-equipped-monitored, which makes them far secure at any time. If you're using a mobile phone, you receive an SMS with the driver's name, mobile number and car number 30 minutes before scheduled departure. The Charges vary and therefore, the estimated fare can be clarified with the customer care executive before booking a taxi. 25% night surcharge on the total fare is applicable between midnight and 5AM.

Some of the Branded Radio Taxis details are below:
- Easy Cabs - +91-22-43434343
- Meru Cabs- +91-22-44224422

For Online Booking, you can visit: http://bookmycab.com/mumbai.php

By Trains:
Most people travel in Mumbai using the Suburban Rail Network commonly referred to as "Locals". Mumbai has an extensive network, with three lines ? the Western Line, the Central Main Line, and the Harbour Line. They Trains on all lines start operations after 4AM and close operations between midnight and 1AM.

If you are a tourist, you can buy a 'Tourist Ticket'. It costs Rs.160 and you can travel in first class compartments of all the three lines during the entire day. Ensure the location of the first class compartment before the train arrives. An easier way to spot the location of the First class compartment is to check the station walls painted with red and yellow slant stripes.

Avoid using local trains during rush hour (first class or otherwise). Rush hour is 8:30AM-10:30AM towards CST and Churchgate and 5:30PM-8:30PM in the opposite direction. **If you must transit during rush hour**, it is advisable to avoid using Mumbai Locals.

There are special coaches for women on both classes. These are designated by green and yellow slant stripes, spot these stripes on the station walls and you'll know where the ladies compartment is. These are generally less crowded and safer.

Restaurants Near TIFR

Colaba Social: 24, Ground Floor, Glen Rose Building, BK Boman Behram Marg, Apollo Bunder, Colaba
Contact: +91 022 22828484

Cafe Leopold: S.B. Singh Road, Colaba Causeway
Contact: +91 022 30151919

Cafe Mondegar: 5A, Metro House, Shahid Bhagat Singh Road, Near Regal Cinema,Colaba
Contact: +91 022 22020591 / 022 22830586

Cafe Churchill: East West Court Building, Opposite Cusrow Baug, Shahid Bhagat Singh Road, Colaba,
Contact: +91 022 22844689 / 022 22042604

Piccadilly: Donald House, Opposite Electric House, Colaba Causeway, Colaba
Contact: +91 022 22823217 / 022 32053233

Khyber Restaurant: 145, MG Road, Kala Ghoda, Fort
Contact: +91 022 22673227 / 022 40396666

Cheval Restaurant: 145, Mahatma Gandhi Road, Kala Ghoda
Contact: +91 022 4039 6632

Starbucks Coffee: Ground Floor, The Taj Mahal Palace & Tower, Apollo Bunder, Colaba, Mumbai
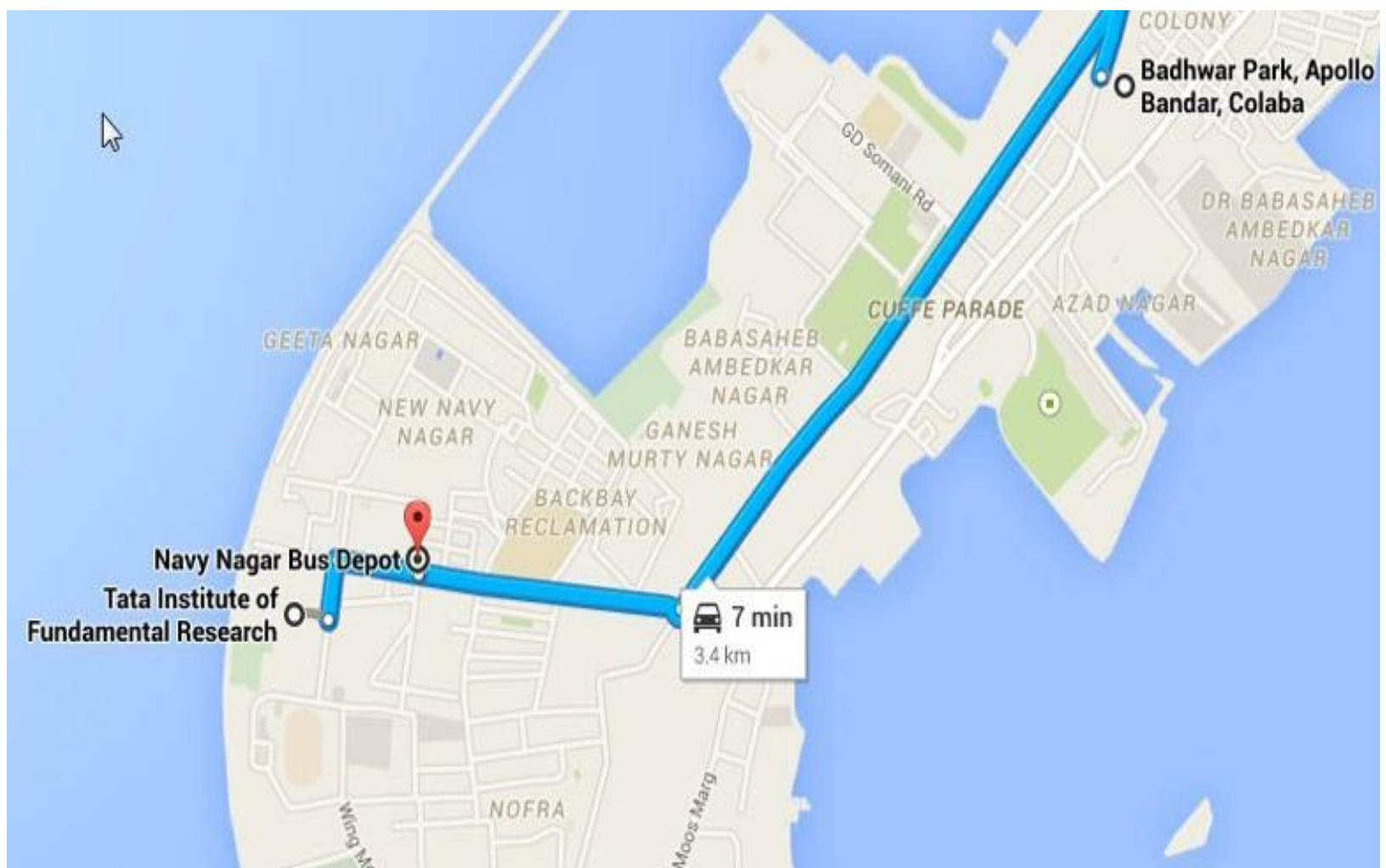
Banks

Normal commercial banking hours are from 10:00 to 16:00 hrs from Monday to Friday, and till 14:00 hrs on Saturdays. Banks are closed on Sundays and on public holidays

Credit Cards / ATM:

There are 24-hr ATMs all over the city of Mumbai. International credit cards are widely accepted. However, you are advised to carry some Indian Rupees for local taxis and street purchases.
The currency in India is the Rupee, which is issued in denominations of 5, 10, 20, 50, 100, 500 & 1000. Please use authorised banks and money changers to exchange foreign currency.

ATMs around TIFR:

There is an ATM within TIFR main building. Other surrounding ATMs are shown in the following map.

Money Exchange:

Please ensure that you receive a certificate of exchange which will be required for the re-conversion of any unused currency. It is illegal to exchange foreign currency other than through authorised money changers or banks. The current rate of exchange can be found at www.xe.com

Some of the exchange dealer offices close to TIFR:

Erudite Forex Dealers Pvt Ltd: Shop No 9, York House, Near Cie Showroom, S B S Road, Colaba
Contact: (+91) 22 2287 2634

International Currency Exchange Pvt Ltd: Shop no 10, York house, SBS Road, Colaba, Opposite Electric House
(+91)-22-61613969

Aishex Forex Private Limited: 9, Sugra Manzil, BEST Marg, Apollo Bandar, Colaba
Contact: (+91) 22 2283 3963

<u>**SIM Cards:**</u>

Foreigners can buy pre-paid sim cards with a 3 month limit on their prepaid SIM connectivity for foreign visitors to India on arrival. There are kiosks right after you clear customs at the international airport. Normally, the pre-paid cards take about 12-24hours to activate.

Documents required to buy a SIM Card:
◦ 2 color **passport photographs** of yourself
◦ A photocopy of the **personal details page of your passport**. You will also have to produce your passport for verification, after which it will be returned to you
◦ A photocopy of your **Indian visa**. You will have to show the original visa for verification
◦ A photocopy of the **proof of your home address** in your country of residence like your passport, driver's license or any other Government issued document. Please carry the original document along for verification
◦ **Proof of where you will be staying in India**. A letter from your Hotel confirming that you are a guest

If you are planning to buy a SIM in India, please carry these documents with you while entering in India.

Some of the mobile service providers close to TIFR are:

Vodafone MiniStores: Shaheed Bhagat Singh Road, A/2 Fatima Manzil, Near Colaba Fire Station, Colaba
Contact: 098200 98200

Vodafone Store: 76, Shop No 3, Asiatic, Indian Merchant Chambers, Veer Nariman Road, Churchgate
Contact: (91)-9820098200

Tata Docomo: Shop No 2, Ground Floor, Kamal Mansion, Colaba, Opposite Electric House
Contact: (+91) 22 65278222, (+91)-8097488079

PLEASE NOTE: The above mentioned information is recommended by the POPL Organizers to assist all delegates. However, the delegate will have to personally procure the SIM Cards if required.

Medical and Emergency

<u>**Medical Aid at TIFR:**</u>
A General Physician will be made available at TIFR for all days during the POPL conference to attend any emergency. Delegates can contact the Help Desk near the registration counter for any further assistance.

<u>**Emergency & Specialist Care outside TIFR:**</u>
Bombay Hospital is closest to TIFR. A panel of select doctors from Bombay hospital is suggested for medical emergencies (please mention TIFR and POPL if you need to contact them):
· Dr. S. Jayaram, Physician, Prof. of Medicine & Dean, Bombay hospital – Tele. No. 22067676 – extn,293
· Dr. B.K. Goyal, Cardiologist, Bombay Hospital - Tele. No. 22067676
· Dr. Parag Munsi, Senior Orthopaedic Surgeon, Bombay Hospital -Tele. No. 22067676 –extn. 689
· Dr. Chitlangia, Surgeon, Bombay Hospital - Tele. No. 22067676 –extn 268

Delegates can reach Bombay Hospital Casualty and ask for the above doctors or their assistants.

<u>**Other Medical Aid Near TIFR:**</u>
Saifee Hospital: No. 15/17, Maharshi Karve Road, Opp Charni Road Railway Station
Contact: +91 22 6757 0111

Hiranandani ENT Hospital: Amar Chand Mansion, M K Road, Colaba
Contact: +91 22 - 25673300/3333

INHS Asvini Hospital: Near R.C. Church, Colaba
Contact: + 91 22 - 22151641

Kalajot Hospital Trust: Devidas Mansion, Mereweather Road, Apollo Bunder, Colaba
Contact: +91 22 - 22834457 / 9821091004 / 9323394872

Pophale Nursing Home: #6, Indian Mercantile Mansion, M. Kama Road, Colaba
Contact: +91 22 - 22020832

Emergency Numbers
- Vasu, KW Conferences Pvt Ltd - +91 97 03 018 693
- Paritosh Pandya, TIFR – +91 98 92 106060
- Ashutosh Gupta, TIFR – +91 98 69 503024
- Mumbai Police Control Room : 100
- Police Info-line: 1090
- Mumbai Police Head Quarter: +91 22 22625020
- Traffic Helpline: +91 22 30403040
- Chhatrapati Shivaji International Airport: +91 22 66851010

Activities

More activities to come, please watch the POPL website.

Morning 5K run on Marine Drive

For running enthusiasts, we will organize a morning 5K run on Marine drive at 6AM on Friday January 16th (second day of POPL). The track is along one of the most beautiful sea shores of Mumbai. Mumbai marathon is on 18th January. You may catch some elite runners practicing.

Do not forget to pack your running shoes!

Time: 6AM, January 16th
Meeting place: Marine drive jogging track across Air India building

Running Track at google maps: http://goo.gl/0maps/ohqsk

How to get there:
- Walk, if your hotel is not too far
- Hail a taxi and ask the taxi to drive you to "Air India building at Marine drive"
- Book a taxi - www.olacabs.com
- Request your hotel to book you a taxi

 If you wish to confirm your participation, please send an email to Ashutosh Gupta at agupta@tifr.res.in

For long distance runners, we are more than happy to suggest a few alternate routes.

Walking with a local

The area around TIFR is called Colaba. It is one of the oldest part of Mumbai. There are many landmarks, slums, highrises, sidewalks, and cafes that speak of many stories of the past. You cannot know the stories via a professional tourist tour. You need to spend sometime with a local to know the corners to turn to find a good story. A local resident of TIFR campus has agreed to take a walk with some conference participants in Colaba.

Time : January 14th, 17:00PM (we can change time and date if there is demand for another time!)
Meeting place: Foyer, Homi Bhabha Auditorium, TIFR
Duration : 1-2 hours
Max capacity : 10-15 people (first e-mail first served!)

If you wish to confirm your participation in the walk, please send an email to Ashutosh Gupta
at agupta@tifr.res.in

Organized Tours

A number of tours has been arranged through a commercial agency – please see the POPL's webpage for more details: http://w3.kwconferences.com/popl/local_tours.html

Tour – 1: Story of Mumbai including dabbawallas | Duration 4 hours

This tour tells the story of the transformation of Mumbai from a mono-cultural sleepy fishing hamlet into a melting pot that is today the commercial capital of India. The tour will showcase all aspects of Mumbai – the narrow geographical layout, the coastline, the daily commuting, the various communities that make up the city, the old heritage district, the old commercial and residential districts and the upcoming districts. The tour includes a short walk through the Heritage District and the Kala Ghoda Art Precinct.

Tour – 2: Spirit of Dharavi | Duration 3.5 hours

This tour takes you to Dharavi, Asia's largest slum, home to nearly a million people. In spite of the grime and the squalor, Dharavi is an area bustling with activity, with an economy estimated to be worth US $ 500 million, and many rags-to-riches stories.

The first migrants to Dharavi were people from the Konkan coast, as well from Gujarat. Potters from Saurashtra were allocated land in Dharavi to establish what is called Kumbharwada. The other settlers were direct migrants to the city, many of them trained in a trade or a craft.
Muslim tanners from Tamil Nadu migrated to Dharavi and set up the leather tanning industry. Other artisans, like the embroidery workers from Uttar Pradesh, started the ready-made garments trade. From Tamil Nadu, workers joined the flourishing business of making savouries and sweets.
On this tour, you can see the people of Dharavi, their homes, their work places, and their spirit. This is a fascinating tour – but not for the squeamish.

Tour – 3: Shopping in Mumbai | Duration 4 hours (flexible)

Shopping in Mumbai is bipolar- air-conditioned and hassle free or street-market and lots of fun.   But whichever way you look at it, in many ways, Mumbai is shopping paradise. There are bargains to be found everywhere, whether you're looking for antiques, curios, carpets, handicrafts, textiles, jewelry, or literally anything.

You can make special requests if you like - If there's a special gift you want to buy, our Guides can help you find the right place. There are fixed price shops for those who don't like bargaining, and other shops for those who do! Either way, our Guides will do their best to help you find what you want.

Tour – 4: Elephant Island (An Ode to Shiva) | Duration 4-5 hours

Once known as Puri or Gharapuri, Elephanta Island was the proud capital of a powerful coastal kingdom. It was named Elephanta by the Portuguese, who took possession of it several centuries later, and found a monolithic stone elephant at the place they first landed.   Today, Elephanta is a World Heritage Site, showcasing legends of Lord Shiva carved in rock cave temples. The cave complex is a collection of shrines, courtyards, inner cells, grand halls and porticos arranged in the splendid symmetry of Indian rock-cut architecture, and filled with exquisite stone sculptures of Hindu Gods and Goddesses. The island is about an hour's boat ride from the Gateway Of India.   Every year, in February, the Elephanta Dance Festival is held. Renowned dancers and musicians perform outside the caves, beneath a star-studded sky, to an appreciative audience. Special launch services and catering arrangements are provided for visitors.

Further information on Mumbai and other Cities can be found here:

http://w3.kwconferences.com/popl/about_mumbai.html

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NOTES

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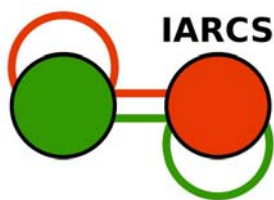
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