



## PSATTT'11: preface

Stéphane Lengrand

► **To cite this version:**

Stéphane Lengrand. PSATTT'11: preface. PSATTT'11: International Workshop on Proof Search in Axiomatic Theories and Type Theories, Aug 2011, Wroclaw, Poland. <inria-00612947>

**HAL Id: inria-00612947**

**<https://hal.inria.fr/inria-00612947>**

Submitted on 8 Aug 2011

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

**PSATTT 2011:  
International Workshop on Proof Search in  
Axiomatic Theories and Type Theories  
August 1, 2011**

Affiliated with CADE 2011, 31 July - 5 August 2011

Wroclaw, Poland

<http://www.lix.polytechnique.fr/~lengrand/Events/PSATTT11/>

## Preface

This volume contains the papers presented at PSATTT-11: International Workshop on Proof-Search in Axiomatic Theories and Type Theories held on July 31, 2011 in Wrocław.

This workshop continues the series entitled “Proof Search in Type Theories” (PSTT at CADE’09, FLOC’10), and enlarges its scope to encompass proof search in axiomatic theories as well.

Generic proof-search in propositional and first-order logic (even second-order, higher-order) are fields that already benefit from a long research experience, spanning from techniques as old as unification to more recent concepts such as focusing and polarisation.

More adventurous is the adaptation of generic proof-search mechanisms to the specificities of particular theories, whether these are expressed in the form of axioms or expressed by sophisticated typing systems or inference systems.

The aim of this workshop is to discuss proof search techniques when these are constrained or guided by the shape of either axioms or inference/typing rules. But it more generally offers a natural (and rather informal) venue for discussing and comparing techniques arising from communities ranging from logic programming to type theory-based proof assistants, or techniques imported from the fields of automated reasoning and SMT but with an ultimate view to build proofs or at least provide proof traces.

Papers were solicited on topics that includes (but are not limited to):

- invertibility of deductive rules, polarity of connectives and focusing devices,
- more generally, development and application of theorems establishing the existence of normal forms for proofs,
- explicit proof-term representations and dynamic proof-term construction during proof-search,
- use of meta-variables to represent unknown proofs to be found,
- use of failure and backtracking in proof search,
- integration of rewriting or computation into deductive systems, as organised by e.g. deduction-modulo
- integration of domain-specific algorithms into generic deductive systems
- transformation of goals into particular shapes that can be treated by domain-specific tactics or external tools
- externalisation of some proof searching tasks and interpretation of the obtained outputs (justifications, execution traces...)
- more generally, interfaces between cooperating tools
- importation of automated reasoning techniques and SMT techniques to proof-constructing frameworks
- quantifier instantiation in SMT techniques, arbitrary alternation of forall/exists quantifiers
- unification in particular theories or in sophisticated typing systems

More generally, contributions about the following topics are welcome

- proof search strategies, their complexity and the trade-off between completeness and efficiency,
- searching for proofs by induction, finding well-founded induction measures, strengthening goals to be proved by induction, etc,
- reasoning on syntaxes with variable binding (in e.g. quantifiers or data structures),
- termination, computational expressivity of related programming paradigms,
- user interaction and interfaces,
- systems implementing any of the ideas described above. Synthesising some of the above aspects into unifying theories is a concern of our research theme that aims at bringing together research efforts of different communities, enhancing their interaction. Contributions made in a spirit of synthesis are thus particularly welcome.

*The organization of the workshop relied on the use of the EasyChair system, which was very useful. The workshop was partially funded by the Agence Nationale pour la Recherche, under the project entitled Proof-Search control in Interaction with domain-specific methods. The workshop organizers would like to thank the program committee for their work, the organizers of the PxTP workshop for a very fruitful partnership, as well as the organizers of the CADE conference.*

July 2011

Stéphane Lengrand

## Organization

The workshop was organized by

Germain Faure	INRIA Saclay
Stephane Lengrand	CNRS
Assia Mahboubi	INRIA Saclay

The program committee consisted of

Jeremy Avigad	Carnegie Mellon University
Evelyne Contejean	LRI, CNRS, Univ Paris-Sud, Orsay
Amy Felty	University of Ottawa
Stephane Lengrand	CNRS
David Pichardie	INRIA Rennes - Bretagne Atlantique
Aaron Stump	CS Department, The University of Iowa
Enrico Tassi	Microsoft Research-INRIA Joint Centre

In partnership with the PxTP workshop (Proof eXchange for Theorem Proving), the program committee solicited invited talks from

Jasmin Christian Blanchette  
John Harrison

Technische Universität München  
Intel corporation.

## Table of Contents

Clausal Presentation of Theories in Deduction Modulo . . . . .	1
<i>Jianhua Gao</i>	
Verifying SAT and SMT in Coq for a fully automated decision procedure . . . . .	11
<i>Mickael Armand, Germain Faure, Benjamin Grégoire, Chantal Keller and Laurent They</i>	
A Framework for Internalizing Relations into Type Theory . . . . .	26
<i>Peng Fu, Aaron Stump and Jeffrey Vaughan</i>	
Consistency Implies Cut Admissibility . . . . .	48
<i>Guillaume Burel</i>	
Regular expression containment as a proof search problem . . . . .	61
<i>Vladimir Komendantsky</i>	

## Author Index

<b>A</b>	
Armand, Mickael	11
<b>B</b>	
Burel, Guillaume	48
<b>F</b>	
Faure, Germain	11
Fu, Peng	26
<b>G</b>	
Gao, Jianhua	1
Grégoire, Benjamin	11
<b>K</b>	
Keller, Chantal	11
Komendantsky, Vladimir	61
<b>S</b>	
Stump, Aaron	26
<b>T</b>	
They, Laurent	11
<b>V</b>	
Vaughan, Jeffrey	26