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12th International Conference, TACAS 2006
Held as Part of the Joint European Conferences
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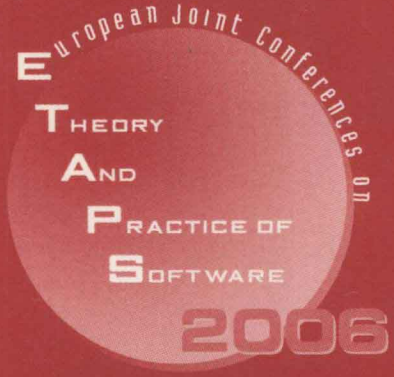

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Foreword

ETAPS 2006 was the ninth instance of the European Joint Conferences on Theory and Practice of Software. ETAPS is an annual federated conference that was established in 1998 by combining a number of existing and new conferences. This year it comprised five conferences (CC, ESOP, FASE, FOSSACS, TACAS), 18 satellite workshops (ACCAT, AVIS, CMCS, COCV, DCC, EAAI, FESCA, FRCSS, GT-VMT, LDTA, MBT, QAPL, SC, SLAP, SPIN, TERMGRAPH, WITS and WRLA), two tutorials, and seven invited lectures (not including those that were specific to the satellite events). We received over 550 submissions to the five conferences this year, giving an overall acceptance rate of 23%, with acceptance rates below 30% for each conference. Congratulations to all the authors who made it to the final programme! I hope that most of the other authors still found a way of participating in this exciting event and I hope you will continue submitting.

The events that comprise ETAPS address various aspects of the system development process, including specification, design, implementation, analysis and improvement. The languages, methodologies and tools which support these activities are all well within its scope. Different blends of theory and practice are represented, with an inclination towards theory with a practical motivation on the one hand and soundly based practice on the other. Many of the issues involved in software design apply to systems in general, including hardware systems, and the emphasis on software is not intended to be exclusive.

ETAPS is a loose confederation in which each event retains its own identity, with a separate Program Committee and proceedings. Its format is open-ended, allowing it to grow and evolve as time goes by. Contributed talks and system demonstrations are in synchronized parallel sessions, with invited lectures in plenary sessions. Two of the invited lectures are reserved for "unifying" talks on topics of interest to the whole range of ETAPS attendees. The aim of cramming all this activity into a single one-week meeting is to create a strong magnet for academic and industrial researchers working on topics within its scope, giving them the opportunity to learn about research in related areas, and thereby to foster new and existing links between work in areas that were formerly addressed in separate meetings.

ETAPS 2006 was organized by the Vienna University of Technology, in cooperation with:

- European Association for Theoretical Computer Science (EATCS);
- European Association for Programming Languages and Systems (EAPLS);
- European Association of Software Science and Technology (EASST);
- Institute for Computer Languages, Vienna;
- Austrian Computing Society;
- The *Bürgermeister der Bundeshauptstadt Wien*;
- Vienna Convention Bureau;
- Intel.

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Overall planning for ETAPS conferences is the responsibility of its Steering Committee, whose current membership is:

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I would like to express my sincere gratitude to all of these people and organizations, the Program Committee chairs and PC members of the ETAPS conferences, the organizers of the satellite events, the speakers themselves, the many reviewers, and Springer for agreeing to publish the ETAPS proceedings. Finally, I would like to thank the Organizing Chair of ETAPS 2006, Jens Knoop, for arranging for us to have ETAPS in the beautiful city of Vienna.

Edinburgh
January 2006

Perdita Stevens
ETAPS Steering Committee Chair

Preface

This volume contains the proceedings of the 12th TACAS, International Conference on Tools and Algorithms for the Construction and Analysis of Systems. TACAS 2006 took place in Vienna, Austria, March 27–31, 2006. TACAS is a forum for researchers, developers, and users interested in rigorously based tools for the construction and analysis of systems. The conference serves to bridge the gaps among communities that are devoted to formal methods, software and hardware verification, static analysis, programming languages, software engineering, real-time systems, and communication protocols. By providing a venue for the discussion of common problems, heuristics, algorithms, data structures, and methodologies, TACAS aims to support researchers in their quest to improve the utility, reliability, flexibility, and efficiency of tools for building systems.

Topics covered by TACAS include specification and verification techniques for finite and infinite state systems, software and hardware verification, theorem-proving and model-checking, system construction and transformation techniques, static and run-time analysis, abstract interpretation, refinement-based and compositional methodologies, testing and test-case generation, analytical techniques for security protocols, real-time, hybrid, and safety-critical systems, integration of formal methods and static analysis in high-level hardware design, tool environments and tool architectures, and applications and case studies.

TACAS traditionally considers two types of papers: full-length research papers, including those describing tools, and short tool-demonstration papers that give an overview of a particular tool and its applications. TACAS 2006 received 118 research and 9 tool-demonstration submissions, and accepted 30 research papers and 4 tool-demonstration papers. Each submission was evaluated by at least three reviewers and each submission co-authored by a PC member was evaluated by at least four reviewers. After a five-week reviewing process, the program selection was carried out in a two-week electronic Program Committee meeting. We believe that the result of the committee deliberations is a strong technical program. As this year's invited speaker, the Program Committee selected Somesh Jha, who presented work on weighted pushdown systems and trust-management systems. We thank the authors of the submitted papers, the Program Committee members, the referees, and especially the Tool Chair Thierry Jeron and the TACAS Steering Committee. Martin Karusseit gave us prompt support in dealing with the online conference management service. The help of Reza Pulungan in the general organization and the production of the proceedings is much appreciated.

TACAS 2006 was part of the 9th European Joint Conference on Theory and Practice of Software (ETAPS), whose aims, organization, and history are detailed in the separate foreword by the ETAPS Steering Committee Chair, Perdita Stevens. We would like to express our appreciation to the ETAPS Steering Committee, particularly Perdita Stevens, and the Organizing Committee for their efforts in making ETAPS 2006 a successful event.

January 2006

Holger Hermanns and Jens Palsberg
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Abstract. The authorization problem is to decide whether, according to a security policy, some principal should be allowed access to a resource. In the trust-management system SPKI/SDSI, the security policy is given by a set of certificates, and proofs of authorization take the form of certificate chains. The certificate-chain-discovery problem is to discover a proof of authorization for a given request. Certificate-chain-discovery algorithms for SPKI/SDSI have been investigated by several researchers. We consider a variant of the certificate-chain discovery problem where the certificates are distributed over a number of servers, which then have to cooperate to identify the proof of authorization for a given request. We propose two protocols for this purpose. These protocols are based on distributed model-checking algorithms for weighted pushdown systems (WPDSs). These protocols can also handle cases where certificates are labeled with weights and where multiple certificate chains must be combined to form a proof of authorization. We have implemented these protocols in a prototype and report preliminary results of our evaluation.

1 Introduction

In access control of shared computing resources, the *authorization problem* addresses the following question: "Given a security policy, should a principal be allowed access to a specific resource?" In trust-management systems [4, 5, 25], such as SPKI/SDSI [9], the security policy is given by a set of signed certificates, and a proof of authorization consists of a set of certificate chains. In SPKI/SDSI, the *principals are the public keys*, i.e., the identity of a principal is established by checking the validity of the corresponding public key. In SPKI/SDSI, *name certificates* define the names available in an issuer's local name space; *authorization certificates* grant authorizations, or delegate the ability to grant authorizations. The *certificate-chain-discovery problem* is to discover a set of certificate chains that provides a proof of authorization for a request by a principal to access a resource.

An efficient certificate-chain-discovery algorithm for SPKI/SDSI was presented by Clarke et al. [8]. An improved algorithm was presented by Jha and Reps [14]. The latter algorithm is based on translating SPKI/SDSI certificates

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