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Tests and Proofs

13th International Conference, TAP 2019
Held as Part of the Third World Congress on Formal Methods 2019
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Preface

Welcome to TAP 2019, the 13th edition of the International Conference on Tests and Proofs. TAP 2019 is part of the Third World Congress on Formal Methods (FM Week 2019). The conference is held in the Alfândega Porto Congress Centre in Porto, Portugal, during October 9–11, 2019.

Conference Description. The TAP conference promotes research in verification and formal methods that targets the interplay of proofs and testing: the advancement of techniques of each kind and their combination, with the ultimate goal of improving software and system dependability.

Research in verification has recently seen a steady convergence of heterogeneous techniques and a synergy between the traditionally distinct areas of testing (and dynamic analysis) and of proving (and static analysis). Formal techniques for counter-example generation based on, for example, symbolic execution, SAT/SMT-solving, or model checking, furnish evidence for the potential of a combination of tests and proofs. The combination of predicate abstraction with testing-like techniques based on exhaustive enumeration opens the perspective for novel techniques of proving correctness. On the practical side, testing offers cost-effective debugging techniques of specifications or crucial parts of program proofs (such as invariants). Last but not least, testing is indispensable when it comes to the validation of the underlying assumptions of complex system models involving hardware or system environments. Over the years, there has been a growing acceptance in research communities that testing and proving are complementary rather than mutually exclusive techniques.

TAP's scope encompasses many aspects of verification technology, including foundational work, tool development, and empirical research. Its topics of interest center around the connection between proofs (and other static techniques) and testing (and other dynamic techniques).

Focus on Replicability of Research Results. We consider that reproducibility of results is of the utmost importance for the TAP community. Therefore, we encouraged all authors of accepted papers to submit an artifact for evaluation. For the first time, TAP 2019 included an optional artifact evaluation (AE) process for accepted papers. An artifact is any additional material (software, data sets, machine-checkable proofs, etc.) that substantiates the claims made in a paper and ideally makes them fully replicable. The evaluation and archival of artifacts improves replicability and traceability for the benefit of future research and the broader TAP community.

Paper Selection. This year, 19 papers were submitted to TAP. After a rigorous review process, with each paper reviewed by at least three Program Committee (PC) members, followed by an online discussion, 10 papers were accepted by the PC for publication in these proceedings and presentation at the conference.

Invited Talks. The conference program and the proceedings also include a keynote by Heike Wehrheim from Paderborn University, Germany, on "Extracting Unverified Program Parts from Software Verification Runs" and an invited tutorial by

Ana Cavalcanti from University of York, UK, on “RoboStar Technology - Testing in Robotics Using Process Algebra.”

Artifact-Evaluation Process. For the first time, TAP 2019 used an AE process. The goals of AE are (1) to have more substantial evidence for the claims in the papers, (2) simplify the replication of results in the paper, and (3) reward authors who create artifacts, i.e., any additional material like software, tools, data sets, test suites, and machine-checkable proofs that substantiates the claims made in the paper.

To valorize their papers, authors of accepted papers could submit an artifact for evaluation to the TAP 2019 artifact-evaluation committee (AEC). Artifacts had to be provided as `.zip` files including all necessary software for AE and a `README` file that explains the artifact and guides the user through the replication of the results. AE had to be possible in the TAP 2019 virtual machine, which runs a Ubuntu 19.04 with Linux 5.0.0.

Each artifact was evaluated by four members of the AEC. The AE proceeded in two phases. In the first phase, the reviewers checked if the artifacts were functional, e.g., no corrupted or missing files exist and the evaluation does not crash on simple examples. All submitted artifacts passed the first phase without any problems and we skipped the author clarification phase in which authors could respond to problems in the test-phase evaluation. In the second phase, the assessment phase, the reviewers tried to reproduce any experiments or activities, and evaluated the artifact with respect to the following five questions:

1. Is the artifact consistent with the paper and the claims made by the paper?
2. Are the results of the paper reproducible using the artifact?
3. Is the artifact complete, i.e., how many of the results of the paper are replicable?
4. Is the artifact well-documented?
5. Is the artifact easy to use?

All submitted artifacts also passed this second phase. Corresponding papers were granted the TAP evaluation badge and two additional pages to describe the artifact. Unfortunately, for only one of the ten accepted papers an artifact was submitted. However, this artifact was of very good quality.

Acknowledgments. We would like to thank, first of all, the authors who submitted their papers to TAP 2019. The PC and the AEC, who did a great job of reviewing, contributed informed and detailed reports, and took part in the discussions during the virtual PC meeting. Special thanks go to the general chair of the FM Week 2019, José Nuno Oliveira, and his overall organization team, for taking care of the local organization. We also thank Alfred Hofmann and his publication team at Springer for their support.

August 2019

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