28th International Conference on Theory and Applications of Satisfiability Testing

SAT 2025, August 12–15, 2025, Glasgow, Scotland

Edited by

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Preface

This volume contains (extended) abstracts of invited talks and full papers presented at the 28^{th} International Conference on Theory and Applications of Satisfiability Testing (SAT 2025). SAT 2025 was held August 12–15, 2025, in Glasgow, Scotland, and was hosted by the University of Glasgow. The conference was co-located with the 31^{st} International Conference on Principles and Practice of Constraint Programming (CP) and the 18^{th} International Symposium on Combinatorial Search (SoCS).

The International Conference on Theory and Applications of Satisfiability Testing (SAT) is the leading annual meeting for researchers working on all aspects of the propositional satisfiability problem broadly construed. In addition to standard propositional satisfiability, the scope of the conference also includes Boolean optimization problems using, e.g., Max-SAT and pseudo-Boolean (PB) solving, quantified Boolean formulas (QBF), satisfiability modulo theories (SMT), model counting, constraint programming (CP), and integer linear programming (ILP) for problems with clear connections to Boolean-level reasoning.

SAT 2025 welcomed original contributions addressing different aspects of SAT, interpreted in a broad sense. This included theoretical advances in areas like exact algorithms and proof complexity, practical search algorithms, knowledge compilation, implementation-level details of SAT-based systems, problem encodings and reformulations, applications including both novel application domains and improvements to existing approaches, as well as case studies and reports on findings based on rigorous experimentation. Both regular (long) papers and short papers were welcomed for submission, with the latter format also including tool papers.

A total of 77 submissions were received by the submission deadline. After an initial filtering of submissions that were clearly incomplete or out of scope, a total of 56 long papers, 9 short papers, and 8 tool papers were reviewed, each by at least 4 program committee members or external expert reviewers invited by members of the program committee. The review process included an author response period, during which the authors were provided an opportunity to respond to initial reviews and to specific queries posed by reviewers. The author response period was followed by an extensive discussion among the reviewers in order to reach a final decision on the list of accepted papers. In the end, 23 long papers, 4 short papers, and 3 tool papers were accepted for publication and presentation at the conference.

In addition to presentations of accepted papers, the technical program of SAT 2025 also included invited talks by eminent researchers in the area. Ruzica Piskac (Yale University), Christine Solnon (CITI, INSA Lyon / INRIA), and Sylvie Thiebaux (Australian National University and University of Toulouse) delivered invited talks on important and contemporary topics of significant interest to the community. The invited talks were joint with the two other co-located conferences.

In connection with the three conferences there were a multitude of associated events. These included the SAT/SMT/AR Summer school organized August 6–8 in St Andrews by Joan Espasa Arxer, Ian Gent, and Ruth Hoffmann and a two-day joint SAT-CP doctoral program organized by Katalin Fazekas and Mun See Chang. Additionally, nine different workshops were held concurrently on August 10 and 11:

- *The 23rd International Workshop on Satisfiability Modulo Theories*, with Sophie Tourret, and Jochen Hoenicke as PC chairs.
- *Pragmatics of SAT*, organized by Mikoláš Janota, and Aina Niemetz.
- *Explanations with Constraints and Satisfiability*, organized by Bart Bogaerts, Tias Guns, Matti Järvisalo, and Jussi Rintanen.

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- *Machine Learning for Solvers and Provers*, organized by Vijay Ganesh and Stefan Szeider.
- *LLMs meet Constraint Solving*, organized by Tias Guns, Serdar Kadioglu, Stefan Szeider, and Dimos Tsouros.
- *Constraint Modelling and Reformulation*, organized by Ian Gent and María Andreína Francisco Rodríguez.
- *Model Counting, Sampling and Synthesis*, organized by Paulius Dilkas and Priyanka Golia.
- *Quantified Boolean Formulas and Beyond*, organized by Hubie Chen, Leroy Chew, Friedrich Slivovsky, and Martina Seidl.
- *Progress Towards the Holy Grail*, organized by Lars Kotthoff.

The results of the following competitions were also announced during the week:

- *SAT Competition 2025*, organized by Cayden Codel, Katalin Fazekas, Marijn Heule, and Markus Iser.
- *Pseudo-Boolean Competition 2025*, organized by Olivier Roussel.
- *Model Counting Competition 2025*, organized by Johannes Fichte, Markus Hecher, and Arijit Shaw.
- *MiniZinc Challenge*, judged by Jimmy H.M. Lee, Barry O'Sullivan, and Roland Yap.
- *XCSP Competition*, organized by Gilles Audemard, Christophe Lecoutre and Emmanuel Lonca.

We are thankful to all individuals, institutions, and organizations that contributed to making SAT 2025 a success, and extend a special thanks to the chairs and organizers of CP and SoCS for smooth collaboration. We thank all authors for submitting their work to SAT 2025, and all participants for actively participating in the conference and its affiliated events. Our deepest thanks go to all program committee members and the external expert reviewers for carefully reading the submissions, providing constructive comments, and participating in discussions that helped in selecting the strongest papers for the technical program of the conference. We are especially grateful to Daniel Le Berre, Massimo Lauria, and Supratik Chakraborty for serving on the award committee, chaired by Daniel Le Berre. Based on nominations by the program committee members, the award committee selected which papers should receive the best paper and best student paper awards.

We are thankful to the three invited speakers for accepting our invitation and enlightening the audience with their insights and perspectives, and to the organizers of all affiliated events. We express a special thanks to Marc Vinyals and Zeynep Kiziltan for serving as the workshop chairs of SAT and CP. We would also like to thank Ciaran McCreesh, who served as the local organizer of SAT 2025, as well as the entire local organizing committee that worked tirelessly in order to keep the conference running smoothly. We are grateful to the SAT Association and its board members for their invaluable advice and support in organizing the conference. We are also indebted to the EasyChair conference management system for facilitating the submission and selection of papers, as well as scheduling the final program, and the staff at LIPIcs for coordinating and assisting with the assembly of these proceedings.

Finally, we wish to thank all sponsors and supporters of SAT 2025. We gratefully acknowledge the financial support provided by the Journal of Artificial Intelligence (AIJ), Cadence, MinLP / The Optimization Firm, JP Morgan, Potassco, Amazon AWS ARG, and Synopsys, which made it possible to keep the conference accessible to as many researchers as possible, particularly to PhD students. Our sincere thanks also goes to the University of Glasgow, the Glasgow City Council, and the Glasgow Convention Bureau for their assistance in organizing the conference and their role in making SAT 2025 a success.

August 2025 Jeremias Berg & Jakob Nordström

Awards

In recognition of outstanding and impactful contributions in areas of relevance to SAT 2025, five awards were presented at the conference. Members of the program committee nominated candidates for best paper and best student paper, where in the latter category the lead author should be a student at the time of submission. Taking these nominations into consideration, the final decisions were then taken by an award committee chaired by Daniel Le Berre.

The **Best Paper Award** of SAT 2025 was conferred to "Streamlining Distributed SAT Solver Design" by Dominik Schreiber, Niccolò Rigi-Luperti and Armin Biere for *"for providing new bases for the practical development of distributed SAT solving"*. The **Best Student Paper Award** was conferred on "Enumerating All Boolean Matches" by Alexander Nadel and Yogev Shalmon for *"for providing a new elegant and efficient SAT-based solution to a problem of interest to both academia and industry"*.

The award committee also selected to highlight two runners-up for the Best Student Paper Award, namely "Fine-Grained Complexity Analysis of Dependency Quantified Boolean Formulas" by Che Cheng, Long-Hin Fung, Jie-Hong Roland Jiang, Friedrich Slivovsky and Tony Tan, *"for exploring tractable fragments and subclasses of DQBF problem"*, and "Efficient Certified Reasoning for Binarized Neural Networks" by Jiong Yang, Yong Kiam Tan, Mate Soos, Magnus O. Myreen and Kuldeep S. Meel, *"for introducing conditional cardinalities as an effective tool in Binarized Neural Network verification"*.

In 2024, the SAT Association established the ***Fahiem Bacchus PhD Award in Satisfiability***. This award distinguishes one outstanding PhD thesis from the past year in the field of satisfiability, broadly construed. The award is named after Fahiem Bacchus, who made significant contributions to the theory and practice of SAT, to the SAT community, and to the SAT Association. The 2025 Fahiem Bacchus Award was conferred at SAT 2025 on Xindi Zhang for his PhD thesis "Hybrid Algorithms for SAT and SMT and Their Applications", defended at the University of the Chinese Academy of Sciences in 2024.

The ***SAT Test-of-Time Award*** is an award instituted by the SAT Association that is given annually to a selected paper from around 20 years back with a large impact on SAT and beyond. The SAT 2025 Test-of-Time Award was conferred on the paper "Effective Preprocessing in SAT Through Variable and Clause Elimination", which appeared in the proceedings of SAT 2005 and was authored by Niklas Eén and Armin Biere.

Finally, the SAT Association conferred a **Distinguished Service Award** on Hans Kleine Büning in honour of his long-lasting and foundational contributions to the series of International Conferences on Theory and Applications of Satisfiability Testing (SAT) and the SAT Association.

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