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Kissat SAT Solver

The Kissat SAT solver is a condensed and improved reimplementation of CaDiCaL in C.

It has improved data structures, better scheduling of inprocessing, optimized algorithms and implementation.

The solver is not incremental yet, but can be used as a library.

News

Kissat won first place in the main track of the SAT Competition 2020 and first place on unsatisfiable instances.

SAT Competition Winners

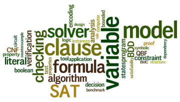
In order to show that SAT solving improved considerably in recent years, particularly also with Kissat in 2020, we collected winner of the SAT Competition from 2002 to 2020 and fixed and ported them to be compatabile with modern compilers.

Then we were running those "all-time winners" on our cluster on the competition instances from 2011, 2019 and 2020, more precisely on the 300 instances from the SAT Competition 2011 application track, the 400 instances from the SAT Race 2019 and t 400 instances from SAT Competition 2020 main track.

Here are plots showing the number of instances solved within a certain time limit, thus in essence the runtime cumulative distribut function (higher is better).

TNF / INF

FMV



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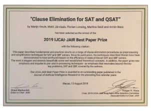
BRAIN 2019
Bolzano Rules and Artificial INtelligence Summit
16-24 September 2019, Bolzano (Italy)

Best Poster & Interaction Award

Sibylle Möhle and Armin Biere
Combining Conflict-Driven Clause Learning and Chronological Backtracking for Propositional Model Counting


"Clause Elimination for SAT and QSAT"

by Marijn Heule, Matti Järvisalo, Florian Lonsing, Martina Seidl and Armin Biere

has been selected as the winner of the

2019 IJCAI-JAIR Best Paper Prize

with the following citation:

This paper describes fundamental and practical results on a range of clause elimination procedures as preprocessing and simplification techniques for SAT and QBF solvers. Since its publication, the techniques described therein have been demonstrated to have profound impact on the efficiency of state-of-the-art SAT and QBF solvers. The work is elegant and extends beautifully some well-established theoretical concepts. In addition, the paper gives new emphasis and impulse to pre- and in-processing techniques - an emphasis that resonates beyond the two key problems, SAT and QBF, covered by the authors.

The IJCAI-JAIR Best Paper Prize is awarded to an outstanding paper published in the Journal of Artificial Intelligence Research in the preceding five calendar years.

Macao, 13 August 2019

Shaul Markovitch
Editor-in-Chief, JAIR

Holger H. Hoos
Chair, 2019 IJCAI-JAIR Best Paper Prize Selection Committee
Associate-Editor-in-Chief, JAIR

Best Student Paper Award

The Program Committee of the

22nd International Conference
on Theory and Applications of Satisfiability Testing

has granted the SAT 2019 Best Student Paper Award to

Katalin Fazekas, Armin Biere and Christoph Scholl
Incremental Inprocessing in SAT Solving

As a sponsor of SAT 2019,
Satalia furnishes this award with 1,000 EUR

Lisboa, Portugal – July 2019

SATALIA

CAV Award

2018

Computer Aided Verification

awarded to

Armin Biere

for

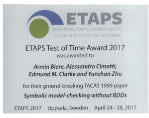
outstanding contribution to the enhancement and scalability of model checking by introducing Bounded Model Checking based on Boolean Satisfiability (SAT) for hardware (BMC) and software (CBMC)

HVC2017

Best Paper Award

Presented to
Marijn Heule, Benjamin Kiesl, Martina Seidl and Armin Biere
For
Pruning Through Satisfaction

IBM cadence Mellanox QUALCOMM Mentor Graphics


ETAPS
EUROPEAN JOINT CONFERENCES ON THEORY & PRACTICE OF SOFTWARE

ETAPS Test of Time Award 2017
was awarded to

Armin Biere, Alessandro Cimatti, Edmund M. Clarke and Yunshan Zhu

for their ground-breaking TACAS 1999 paper
Symbolic model-checking without BDDs

ETAPS 2017 Uppsala, Sweden April 24 - 28, 2017

HVC Award

2015 HVC Award presented to
Prof. Armin Biere
Johannes Kepler University in Austria

For his major contributions to the formal verification and computational logic communities

Michael Vinov
General Chair

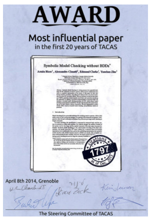
Nir Piterman
Program Chair

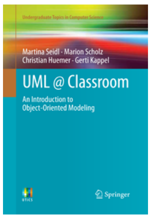
IBM cadence Mellanox Mentor Graphics QUALCOMM SanDisk

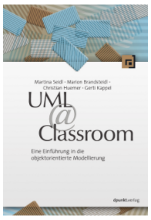
fmcad

Best Paper award

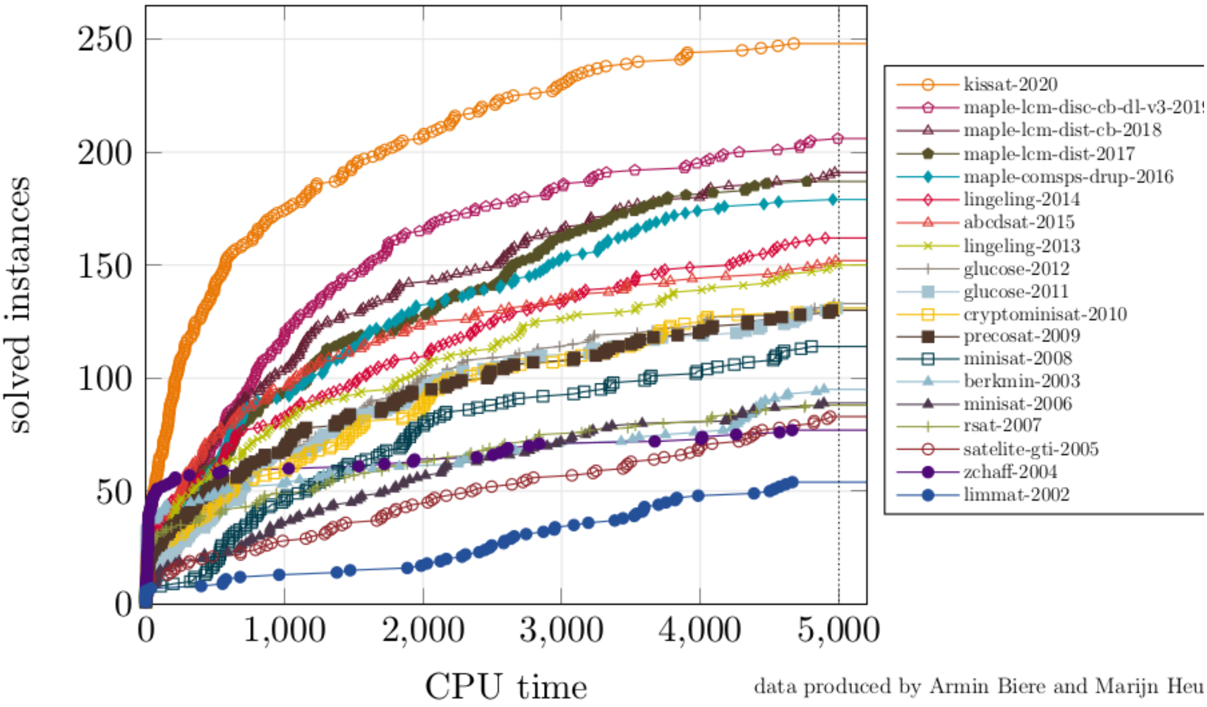
[illegible]


AWARD
Most influential paper
in the first 20 years of TACAS
Symbolic Model Checking without BDDs
citations
1797
as of Dec. 2013
April 8th 2014, Grenoble
The Steering Committee of TACAS


Undergraduate Topics in Computer Science
Martina Seidl · Marion Scholz
Christian Huemer · Gerti Kappel
UML @ Classroom
An Introduction to Object-Oriented Modeling
Springer

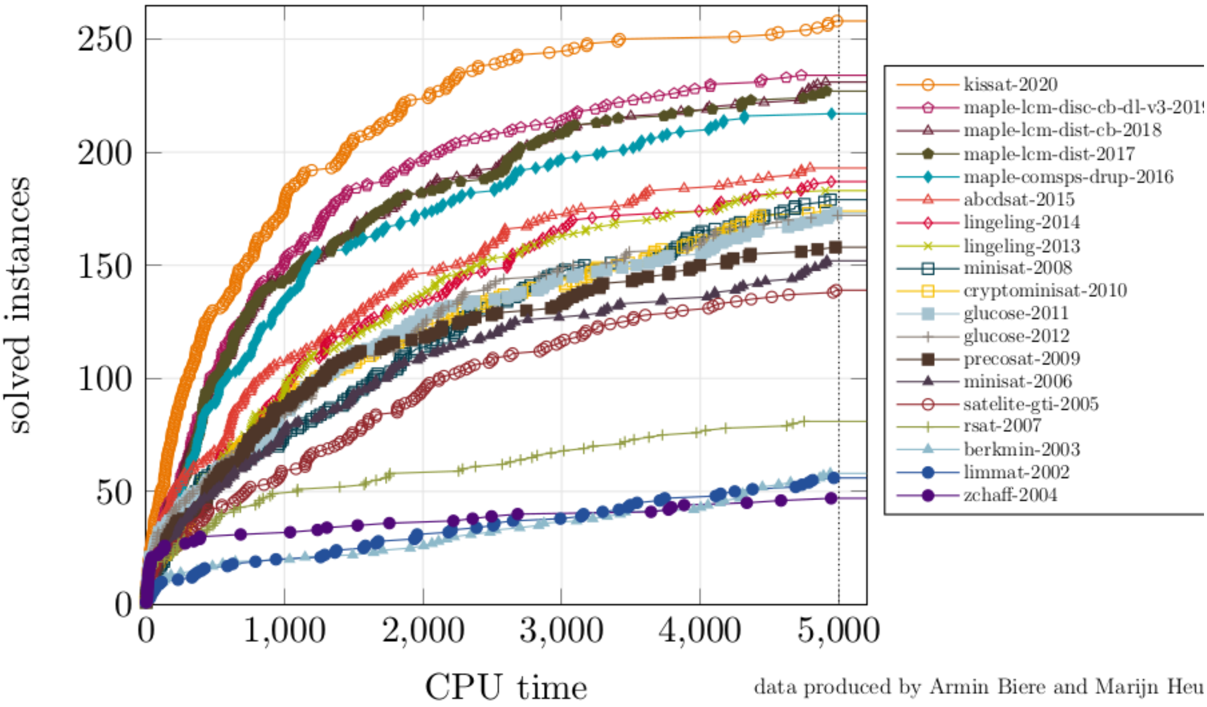

Martina Seidl · Marion Brandsteidl · Christian Huemer · Gerti Kappel
UML @ Classroom
Eine Einführung in die objektorientierte Modellierung
dpunkt.verlag

SAT Competition Winners on the SC2020 Benchmark Suite

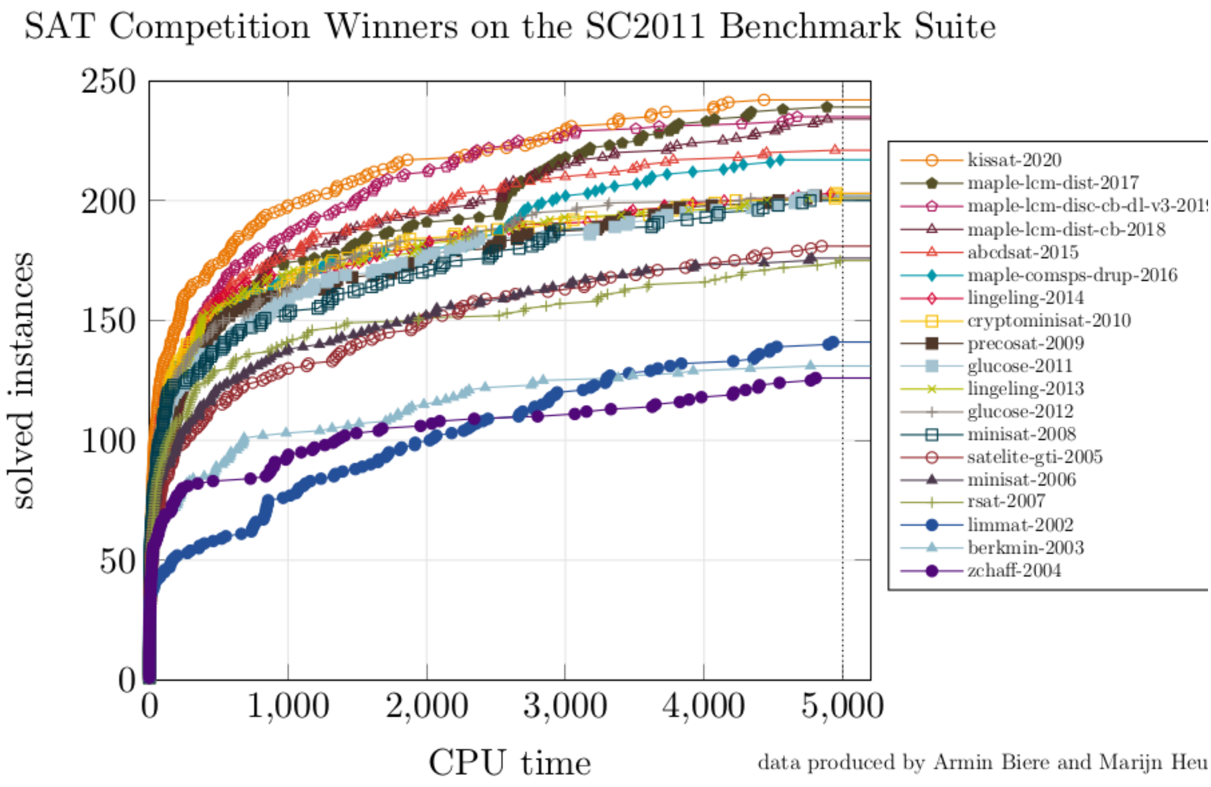


data produced by Armin Biere and Marijn Heu

SAT Competition Winners on the SC2019 Benchmark Suite



data produced by Armin Biere and Marijn Heu


SAT Competition Winners on the SC2011 Benchmark Suite

data produced by Armin Biere and Marijn Heu

Note, the SAT Competition 2011 application track had only 300 instances, while the other two benchmarks sets from 2019 and 20
consist of 400 apparently much harder instances each.

Our cluster has two Intel(R) Xeon(R) CPU E5-2620 v4 @ 2.10GHz CPUs and 128 GB of main memory on each node, thus is sligh
slower, but comparable to the StarExec cluster used in the competition. As time limit we used 5000 seconds as it is now common
the competition. Main memory was limited to 8 GB for 2011 and 2019 to utilize our cluster best. For 2020 we increased the limit to
GB, which allowed all solvers to stay below the memory limit (the organizers announced a 24 GB memory limit originally but actua
used 128 GB).

Download

The latest version is available on GitHub at https://github.com/arminbiere/kissat

The following source code submitted to the SAT Competition 2020 won first place in the main track and first place on the unsatisfiable instances of the main track:

[kissat-sc2020-039805f2.tar.xz]

The code has an MIT license.

Resources

See the following SAT Competition 2020 system description for more details:

Armin Biere, Katalin Fazekas, Mathias Fleury, Maximillian Heisinger.
CaDiCaL, Kissat, Paracooba, Plingeling and Treengeling Entering the SAT Competition 2020.
To appear in *Proc. of SAT Competition 2020 - Solver and Benchmark Descriptions*.
[paper | bibtex | kissat | cadical | paracooba | plingeling | treengeling]

There was also a related talk at POS'20:

Armin Biere and Mathias Fleury.
Chasing Target Phases
11th Workshop on Pragmatics of SAT (POS'20)
Cyberspace, July 3, 2020.
[slides [video | experiments]